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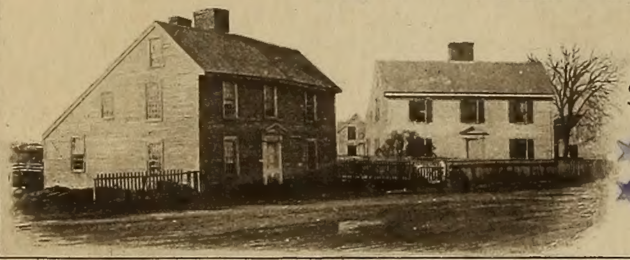

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ENCYCLOPÆDIA.

ETHIOPS ANTIMONIAL, MARTIAL, and MINERAL. See PHARMACY-*Index*.

ETHMOIDES, in anatomy, a bone ſituated in the middle of the baſis of the forehead or os frontis and at the top of the root of the noſe, filling almoſt the whole cavity of the noſtrils. It has its name from εθμος *cribrum*, "ſieve," and ειδος "form," becauſe all ſpongy and porous. See ANATOMY, nº 17.

ETHNARCHA, ETHNARCH, (formed of εθνος *nation*, and αρχε *command)*, a governor or ruler of a nation.

There are ſome medals of Herod I. ſurnamed the *Great*, on one ſide whereof is found 'Ηρωδου, and on the other Εθναρχου, q. d. *Herod the Ethnarch*. After the battle of Philippi, we read that Antony paſſing over into Syria, conſtituted Herod and Phaſael his brother tetrarchs, and in that quality committed to them the adminiſtration of the affairs of Judea (Joſ Ant. lib. xiv. cap. 23.) Herod therefore had the government of the province before ever the Parthians entered Syria, or before Antigonus's invaſion, which did not happen till ſix or ſeven years after Herod was commander in Galilee. (Joſ. lib. xiv. cap. 24, 25.) Conſequently Herod was then truly ethnarch, for he can be no otherwiſe denominated; ſo that it muſt have been in that ſpace of time that the medals were ſtruck, which only give him this title: which medals are a confirmation of what we read in hiſtory of the government which that prince was intruſted with before he was raiſed to the royalty.

Joſephus gives Herod the appellation of *tetrarch* in lieu of that of *ethnarch;* but the two terms come ſo near to each other, that it is eaſy to confound them together.

Though Herod the Great left by will to Archelaus all Judea, Samaria, and Idumea, yet Joſephus tells us he was then only called *ethnarch*.

ETHNOPHRONES, in antiquity, a ſect of heretics in the ſeventh century, who made a profeſſion of Chriſtianity, but joined thereto all the ceremonies and follies of paganiſm, as judicial aſtrology, ſortileges, auguries, and other divinations.

ETIQUETTE, a French term, primarily denoting a ticket or title affixed to a bag or bundle of papers, expreſſing its contents. It is alſo uſed, when applied to the Spaniſh and ſome other courts, to ſignify a particular account of what is to be done daily in the king's houſehold, and in the chief ceremonies relating to it. It likewiſe denotes thoſe forms that regulate the decorum of conduct towards perſons of various ranks and ſtations.

ETMULLER (Michael), a moſt eminent phyſician, born at Leipſic in 1646. After having travelled through the greateſt part of Europe, he became profeſſor of botany, chemiſtry, and anatomy, at Leipſic; where he died in 1683. He was a very voluminous writer; his works making no leſs than 5 vols folio, as printed at Naples in 1728. His ſon Michael Erneſt Etmuller was alſo an ingenious phyſician, who publiſhed ſeveral pieces, and died in 1732.

1
Houel's obſervations.

ETNA, or ÆTNA, a famous burning mountain of Sicily, and the largeſt in Europe; of which an account has been already given under the latter ſpelling ÆTNA. The following additional particulars relating to the eruptions, ſize, ſcenery, and products, of this celebrated volcano, are collected from the *Voyage Pittoreſque* of M. Houel, who appears to have ſurveyed it with greater accuracy than any former traveller.

The form of mount Etna is that of a cone, very broad at the baſe, which is more than 40 miles in circumference. From the bottom you aſcend ten leagues before reaching its ſummit on the ſouth ſide; and on any of the other ſides, the way being not ſo ſtraight, would be conſiderably longer. Etna is entirely compoſed of ſubſtances that have been diſcharged from the volcano in its various exploſions.

It appears from the quantities of marine bodies depoſited all over the under part of Etna, that it muſt have been once covered by the ſea to at leaſt one half of its preſent height. The whole iſland of Sicily, and the greateſt part of mount Etna, have been, in our author's opinion, formed under water. But the period when the eruptions from this volcano firſt commenced, the manner in which the ſea ſubſided, and the preciſe time at which it fell ſo low as its preſent level on the ſhores of Sicily, are facts concerning of which we have no certain knowledge.

The general principle, however, M. Houel thinks may be regarded as undeniable. When this mountain ſtood half under water, the currents of the ocean would gradually accumulate upon it large maſſes, both of its own productions, ſuch as ſhells, and bones of fiſhes, and of various other matters, which would be intermixed with the volcanic matters diſcharged from the focus of the burning mount. In a long ſeries of ages theſe ſtrata of heterogeneous matters would naturally become ſo conſiderable as to form the enormous maſs of mountains with which the volcano is now ſurrounded. The currents of the ocean might often convey the volcanic matters to a conſiderable diſtance from the volcanic focus. And there are mountains at no ſmall diſtance from Etna, which ſeem to have been produced in this manner. Thoſe of Carlintini, at the diſtance of 15 leagues, conſiſt chiefly of a mixture of pozzolana, with calcareous matters. At Lintini, and in places around it, there are diſtinct beds of pozzolana, ſcoriæ, and real lava, as well as others in which all theſe matters are blended together in a maſs of calcareous matter. At Palazzolo, about 24 miles from the city of Syracuſe, the ſides of the hills having been cut by the ſtreams which run down them, in many places to a conſiderable depth, diſplay huge maſſes of lava, and extenſive beds of pozzolana. In the neighbourhood of Noto there are alſo volcanic productions to be found.

At Pachino, where the iſland of Sicily forms an angle, there are a range of hills extending for ſeveral miles, which conſiſt of pozzolana.

The province of Val de Noto is more homogeneous in the matters of which its ſoil conſiſts, than the two other dales of Sicily. Theſe, in every hill which they contain, exhibit a variety of different matters. So amazing, indeed, is that variety, that they may be conſidered as exhibiting a collection of ſpecimens of all the different materials which enter into the compoſition of the globe. In thoſe two dales few volcanic productions have been yet obſerved. But it is not to be inferred for this reaſon, that they contain but few. They may be hereafter diſcovered in great plenty. In the volcano of water at Maccalubbe, between Aragona and Girginti; in the baths of Caſtellamare, near Alcamo and Segeſte; in the baths of Termini, in the iſles of Lipari; in the hot waters of Ali, between Meſſina and Taormina, by the lake in the valley of Caltagirone; in all theſe places which comprehend the whole circumference of Sicily, the influence of the volcano of Etna is, in ſome meaſure, felt. Nay, it would even ſeem, that in theſe places there are ſo many volcanic craters. All of theſe are ſo diſpoſed as to ſhow that they exiſted prior not only to the volcanic matters, but to the other ſubſtances intermixed with them.

The waters of the ſea have, in former times, riſen much higher than at preſent. But how they retreated, or whether they are to continue ſtationary at their preſent height, we know not. For more than 2000 years, during which Sicily has been inhabited, and has had cities and harbours, the ſea has not been obſerved either to recede or encroach in any conſiderable degree.

When the ſea ſubſided from mount Etna, the mountain muſt have been covered over with ſuch matter as the ſea uſually depoſits; conſequently with calcareous matters. A part of thoſe matters would be indurated by the action of the atmoſphere, while the reſt would be carried down by the rain-waters, and again conveyed into the ocean. The torrents of rain-water which pour down the ſides of mount Etna have furrowed its ſides, by cutting out for themſelves channels; and they have removed from its ſummit, and are ſtill removing, to a farther diſtance, all the extraneous bodies upon it. In many places they flow at preſent over a channel of lava, having cut through all the matters which lay above it: ſtill, however, there remain in many places both calcareous matter and other marine productions, which ſhow that this volcano has been once covered by the waters of the ocean. But theſe are daily waſting away; not only the rains, but men likewiſe, who carry them off as materials for lime and for building, conſpire to deface them.

No fewer than 77 cities, towns, and villages, are ſcattered over the ſides of Etna. They are moſt numerous on the ſouth ſide, where the temperature of the air is milder than on the north. Reckoning thoſe cities, towns, and villages, one with another, to contain each 1200 or 1500 ſouls, the whole number of the inhabitants of mount Etna will then be 92,400, or 115,500. But it is certainly much more conſiderable.

Fig. 1. On plate CLXXXIV. is exhibited a view of the north-eaſt ſide of the mountain, taken at ſea. The lower part preſents to the eye very extenſive plains entirely covered with lava of different thickneſs, on which vegetation has not yet made any progreſs. The nearer the ſhore the more barren is the ground; while the fertility of the ſoil increaſes as we advance farther inwards. The mountain is every where full of vaſt excavations; which our author conſiders as a proof, that inſtead of increaſing in bulk, it is actually in a ſtate of decay and diminution. The vaſt torrents of lava which overſpread the ſides of it from time to time, he conſiders as inſufficient to repair the waſte occaſioned by rains, rivulets, and torrents flowing down from the ſummit. Unleſs the eruptions, therefore, become more frequent than they have been for ſome time paſt, he ſuppoſes that, by degrees, the height of the mountain muſt be reduced to that of the ſurrounding beds of lava. He had not an opportunity of meaſuring the altitude of Etna himſelf; but he obſerves that it had been done by the celebrated M. de Sauſſure, who found the elevation to be 10,036 feet. This was done on the 5th of June 1773, at 20 minutes after ſeven in the morning. The height of the barometer on the moſt elevated part at the brink of the crater was 18 inches $11\frac{1}{4}$ lines; which, by the neceſſary corrections, is reduced to 18 inches $10\frac{15}{18}$ lines. At the ſame time the mercury at Catania, placed only one foot above the level of the ſea, ſtood at 28 inches $2\frac{17}{18}$ lines; which muſt be reduced to 28 inches $1\frac{1}{8}$ lines, on account of the neceſſary corrections for the thermometer.

2 Account of the north-eaſt ſide of the mountain.

3 Suppoſed to be in a ſtate of decay.

4 Sauſſure's account of the height of Etna.

5 Mountains of calcareous matter.

From Giana our author had an opportunity of contemplating the vaſt number of calcareous mounts ſcattered over that part of Etna; which (he ſays) "are nothing more than fragments, the ſlender remains of thoſe enormous maſſes which have been depoſited all around the baſe of mount Etna; and are a very curious monument of the revolutions which this mountain has undergone." They are of a true calcareous nature; and the inhabitants are accuſtomed to ſupply themſelves with limeſtone from them. They alſo uſe the ſtones of which theſe mounts are compoſed for the purpoſes of building; as the lava is ſo hard that it cannot be cut without the greateſt difficulty, and they have no other ſtone in theſe parts.

Leaving this place, our author travelled over ſeveral extenſive plains of lava, covered on each ſide of the way with ſtunted trees, but without any cultivation; the lava being of that kind which is very unfavourable to the growth of vegetables. Arriving at St Leonardo, he obſerved the courſe of the eruption of water in 1755, and which is mentioned under the former article Ætna.

ETNA.

Plate CLXXXIV.

Fig. 1.

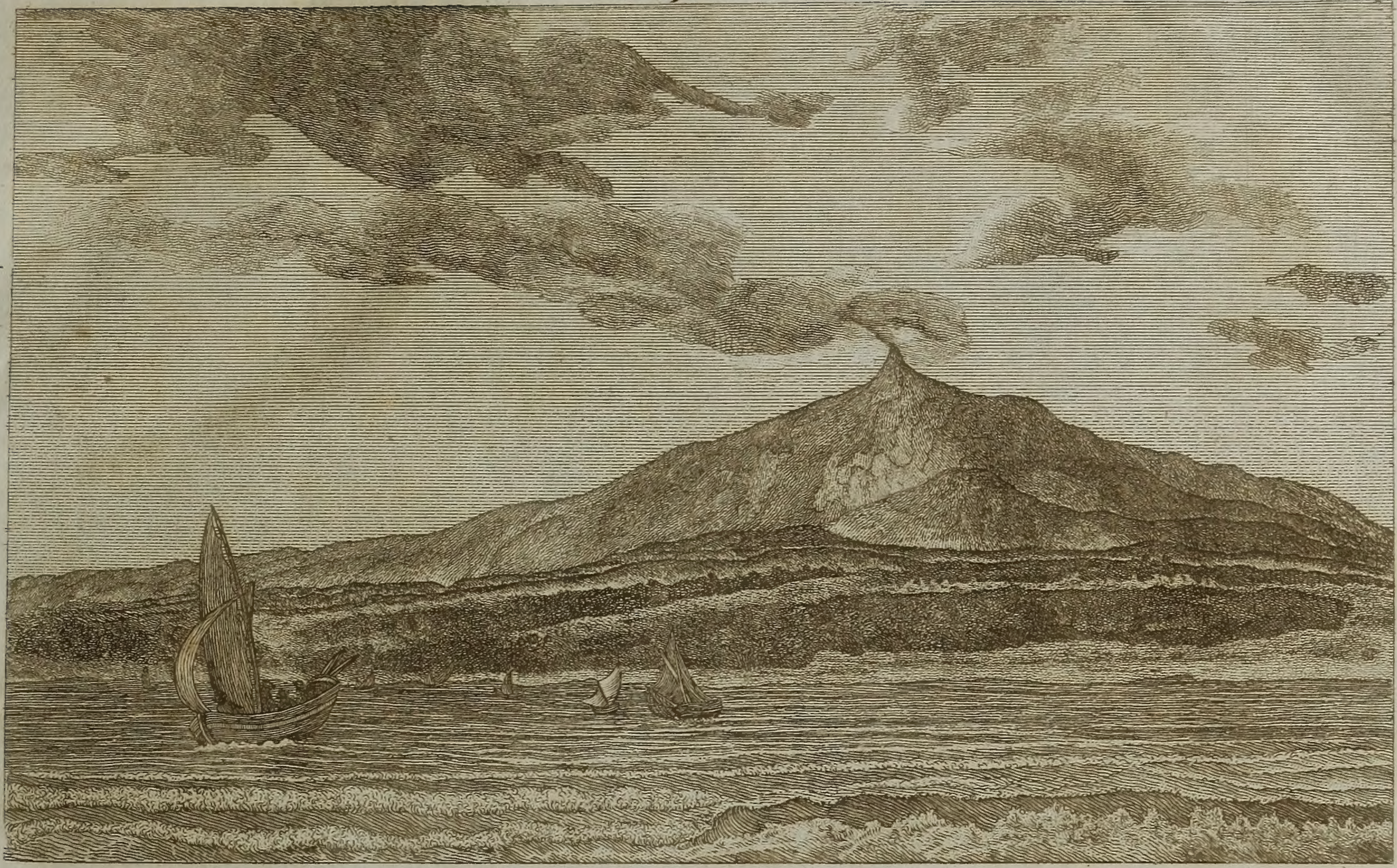
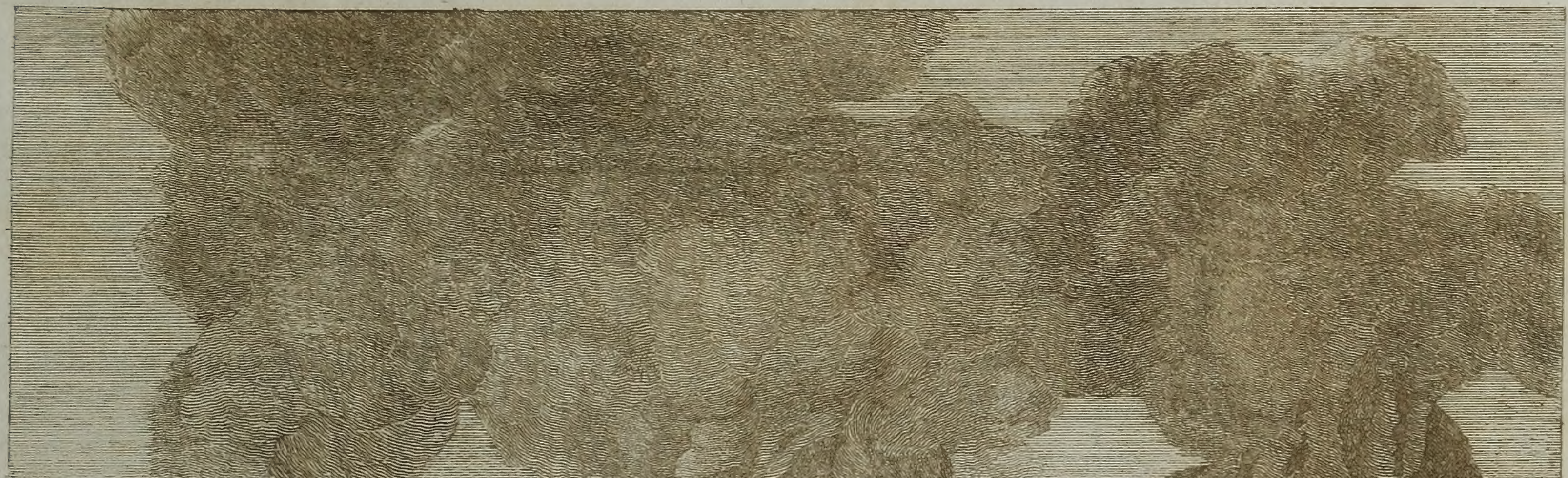


Fig. 2.



J. Trenchard Sculp.

6 Particular account of the eruption of water in 1755.

This water took its courſe down the weſt ſide of the mountain; and the channel which it cut for itſelf is ſtill viſible. The eruption of water from burning mountains is ſtill much leſs frequent than that of lava or half vitrified ſolid matters, aſhes, &c. though that of water, and even mixed with the ſhells of marine animals (though we are not told whether it was ſalt or not), has ſometimes been obſerved in other volcanoes, particularly Veſuvius. The eruption we now ſpeak of happened in the month of February 1755. It was preceded by an exceedingly thick black ſmoke iſſuing from the crater, intermixed with flaſhes of fire. This ſmoke gradually became thicker, and the burſts of flame more frequent. Earthquakes and ſubterraneous thunder convulſed the mountain, and ſtruck the inhabitants of the adjacent parts with the utmoſt terror. On Sunday, the ſecond of March, the mountain was ſeen to emit a huge column of ſmoke exceedingly denſe and black, with a dreadful noiſe in the bowels of the earth, accompanied alſo with violent flaſhes of lightning. From time to time there were loud cracks, like the exploſions of cannon; the mountain appeared to ſhake from its foundations; the air on that ſide next Maſcali became very dark, and loud peals of thunder were heard. Theſe ſeemed to iſſue from two caverns, conſiderably below the ſummit, on the ſide of the mountain, and were accompanied with violent blaſts of the wind like a tempeſt.

Theſe terrible phenomena continued and increaſed; Etna ſeemed ready to ſwallow up at once all thoſe materials which it had been for ſo many years diſgorging, or rather about to ſink at once into the bowels of the earth from whence it appeared to have been elevated. The proſpect was far beyond any idea that can be given by deſcription of this tremendous ſcene. The inhabitants were alarmed beyond meaſure; the ſight of the flames driven by the wind againſt the ſides of the mountain, the ſhocks of the earthquake, and the fall of rocks, ſtruck the imagination with a horror not to be conceived. During this dreadful commotion an immenſe torrent of water was emitted from the higheſt crater of the mountain. The whole ſummit of Etna was at that time covered with a thick coating of ſnow. Through this the boiling water directed its courſe eaſtward; and, in its paſſage, met with frightful precipices. Over theſe it daſhed with the utmoſt violence, adding its tremendous roaring to the complicated horrors of this awful ſcene. The ſnow, melting inſtantaneouſly as the boiling torrent advanced, increaſed its deſtructive power by augmenting its quantity, while the miſchievous effects of the heat were ſcarce diminiſhed by reaſon of the immenſe quantity of boiling liquid which continued to pour from the ſummit of the mountain.

This boiling torrent having daſhed its awful cataracts from one chain of rocks to another, at length reached the cultivated plains, which it overflowed for a number of miles. Here it divided itſelf into ſeveral branches, forming as many deep and rapid rivers; which, after ſeveral other ſubdiviſions, diſcharged themſelves into the ſea.

Though the mountain continued to diſcharge water in this manner only for half an hour, the ravages of it were very terrible. Not only thoſe of common inundations, ſuch as tearing up trees, hurrying along rocks and large ſtones, took place here, but the ſtill more dreadful effects of boiling water were felt. Every cultivated ſpot was laid waſte, and every thing touched by it was deſtroyed. Even thoſe who were placed beyond the reach of the torrent, beheld with inexpreſſible horror the deſtruction occaſioned by it; and though the alarming noiſes which had ſo long iſſued from the mountain now ceaſed in a great meaſure, the ſhocks of earthquakes, and the violent ſmoke which continued to iſſue from the mountain, ſhowed that the danger was not over. Two new openings were now obſerved, and two torrents of lava began to make their way through the ſnow.

On the 7th of March a dreadful noiſe was again heard in the bowels of the mountain, and a new column of very thick and black ſmoke began to iſſue from it. A horrid exploſion of ſmall ſtones ſucceeded; ſome of which were carried as far as the hills of Maſcali, and great quantities of black ſand to Meſſina, and even quite over the ſtrait to Reggio in Calabria. On the ſhifting of the wind to the northward this ſand reached as far as the plains of Agoſta. Two days after the mountain opened again, and a new torrent of lava was diſcharged; which, however, advanced very ſlowly towards the plain, moving only at the rate of a mile in a day. It continued to flow in this manner for ſix days, when every thing appeared ſo quiet, that the Canon Recupero ſet out to view the changes which had taken place.

7 Courſe of the torrent traced by Recupero.

That gentleman's deſign was to trace the courſe of the dreadful torrent of water abovementioned. This he was very eaſily enabled to do by the ravages it had made; and, by following the channel it had cut all the way from the ſea to the ſummit of the volcano, he found that this immenſe quantity of water had iſſued from the very bowels of the mountain. After iſſuing from the crater, and increaſing its ſtream by paſſing through and melting the ſnow which lay immediately below the ſummit, it deſtroyed in an inſtant a fine and extenſive foreſt of fir trees. All of theſe were torn up by the violence of the current, though many were no leſs than 24 or 30 inches in diameter. He obſerved that the great ſtream had in its deſcent, divided itſelf into four branches; and theſe had again ſubdivided themſelves into ſeveral ſmaller ones, eaſily diſtinguiſhable by the quantity of ſand they had depoſited. Afterwards reuniting their ſtreams, they formed many iſlands, and rivers 900 feet in breadth, and of a depth which could not eaſily be determined. Proceeding farther down, and ſtill forcing its way among the beds of old lava, the channel of the waters was widened to 1500 feet, until it was again contracted in the valleys as before Every object which ſtood in the way of this tremendous torrent was moved from its place. Enormous rocks were not only hurried down, but ſeveral of them moved to more elevated ſituations than thoſe they formerly occupied. Whole hills of lava had been removed and broken to pieces, and their fragments ſcattered along the courſe of the river, and the valleys were filled up by vaſt quantities of ſand which the waters had depoſited. Our author obſerved, that even at that time he viſited the mountain, about 10 years after the eruption, the whole ſide of it ſtill bore the marks of this deluge.

On M. Houel's arrival at Jaci Catena, he inquired

8 Account of a remarkable well.

for the phyſician of the place; it being cuſtomary for ſtrangers to do ſo who want to learn any thing concerning the curioſities of the country, as the phyſicians there are generally thoſe who have any pretenſions to literature. By this guide he was ſhown a well which they call *Holy Water*. There is a flight of ſteps from the ſurface of the ground to that of the water. The well itſelf is 20 feet wide and 40 feet deep. It is ſupplied by three different ſprings, each of which is ſaid to have a peculiar taſte. The phyſician informed our author, that one of them reſembled milk in its taſte; another taſted like ſoap; and the third had the taſte of common water: but our author, after taſting each of them, could not find any remarkable difference.

9 Ancient baths diſcovered.

10 Springs of St Venera.

In his way to La Trizza, our author diſcovered ſome very ancient baths with ſtoves. They had been built here on account of a ſpring of warm ſulphureous water, ſuppoſed to be excellent for the cure of cutaneous diſorders; and for which purpoſe they are ſtill made uſe of. They are now called the *Springs of St Venera*, of whom there is an image here. The fountain from which they flow is on a level with the ſurface of the ground. The water taſtes very diſagreeably of ſulphur; and depoſits a quantity of white impalpable powder, adhering to herbs and ſtones, over which it paſſes. This ſubſtance our author calls the *cream of ſulphur*; though it is probably a ſelenitic ſubſtance formed by the decompoſition of the ſulphur, and the union of its acid with ſome calcareous matter which held it in ſolution before.

11 Baſaltic rocks about Trizza.

From this place our author proceeded to the ſea-port of Trizza, a ſmall place, which with the adjacent country contains only about 300 inhabitants. Off the harbour of this rock is a baſaltic rock, which ſeems to be only the remains of a much larger one deſtroyed by the action of the air. All around are long ranges of baſaltes, the ſpecies of which are very various.

12 Rocks of the Cyclops.

The rocks of the Cyclops ſtand round the ſmall harbour of La Trizza; and from this view we perceive a number of rocks of very different heights. All of them appear more or leſs above water, though ſome are ſo low that they cannot be ſeen without approaching very near; and this circumſtance renders the harbour inacceſſible to veſſels of any conſiderable burden, at the ſame time that, by reaſon of the depth of the ſea, it is impoſſible either to cut or unite them by a mole. The principal of theſe rocks is the extremity of an iſland, one half of which is compoſed of lava placed on a baſaltic baſe; over this is a cruſt of pozzolano, combined with a kind of white calcareous matter of a pretty hard and compact conſiſtence; and which, by the action of the air, aſſumes the appearance of knotty porous wood. On this ſubject our author obſerves, that "the rock, at ſome former period, had become ſo hard as to ſplit, and the clefts were then filled up with a very hard matter which was porous on all ſides like ſcoriæ. That matter afterwards ſplit alſo; leaving large interſtices, which in their turn have been filled up with a kind of compound yellow matter. The iſland appears to have been formerly inhabited, but is at preſent deſtitute both of inhabitants and of culture, only the people of La Trizza feed a few goats upon it."

13 Different kinds of baſaltes.

To the ſouthward of the harbour of La Trizza we obſerve ſeveral fragments of baſaltes, both in the form of needles and in that of priſmatic columns of a very regular form, and which may be eaſily ſeparated from one another. From the poſition in which theſe fragments are diſpoſed, it appears that the maſs to which they belong muſt have ſuffered ſome very violent ſhock; otherwiſe ſuch huge rocks could never have been broken, overturned, and ſcattered in directions ſo very different from their original poſitions. In one of theſe ruins there are ſome parts harder than the reſt, which withſtand the action of the air, while the intervening ſpaces yield to it, and appear to be thus deſtroyed. In ſome others this effect is much more remarkable; becauſe the column happens to be much farther advanced towards a ſtate of diſſolution, the parts of which they conſiſt being already disjoined; and in each of thoſe which project we perceive a fiſſure: which ſhows that each of thoſe parts may be divided into two. "They are indeed (ſays our author) actually divided, and diſplay a convexity iſſuing from a concavity, like a pile of hats placed one upon another, when they are removed one by one; which is a very curious ſingularity."

14 Promontory of the Caſtel d'Aci deſcribed.

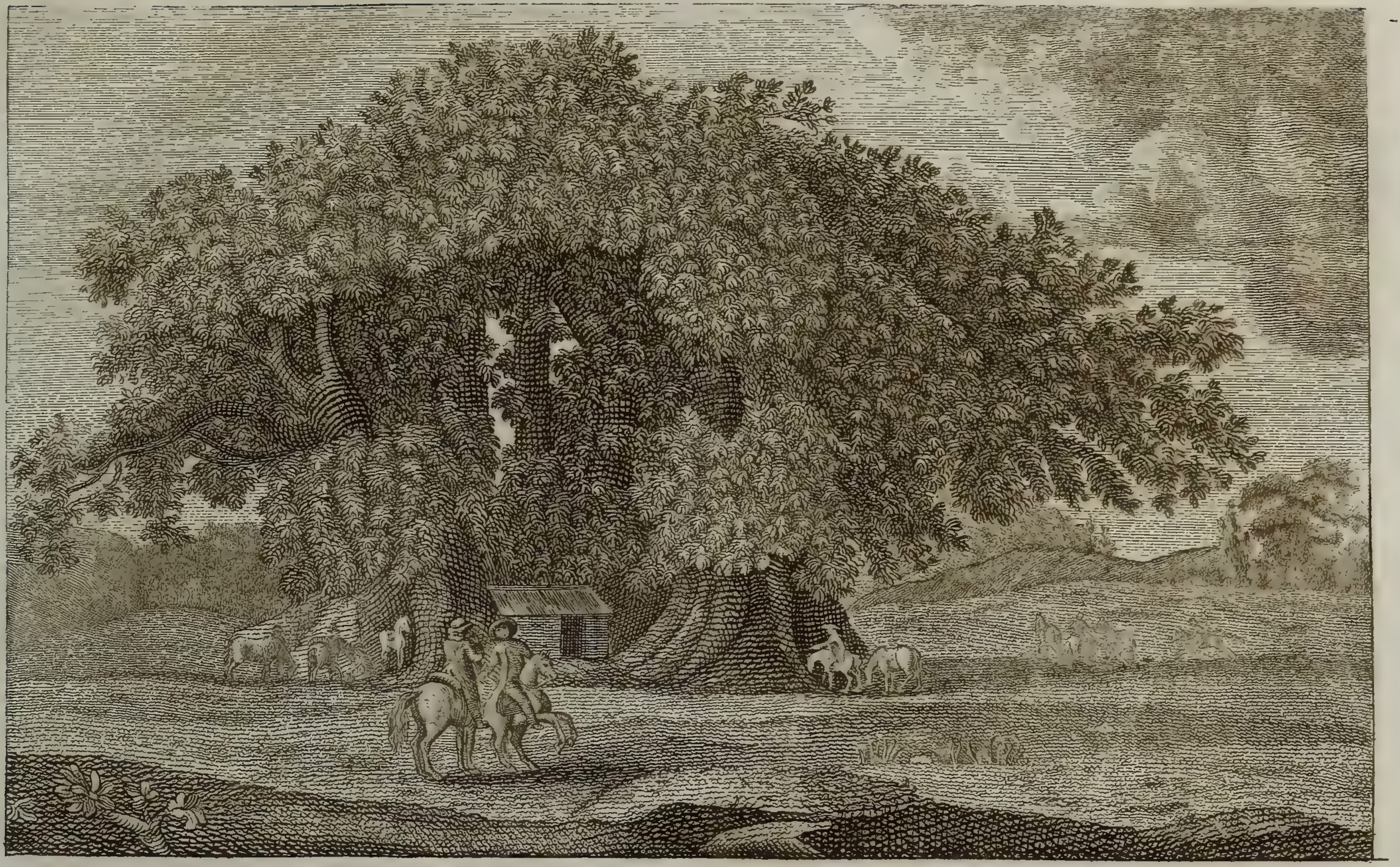
Continuing his journey ſtill ſouthward, our author arrived at the promontory of the Caſtel d'Aci. This is the moſt ſingularly curious of all that are in the neighbourhood of Etna. The ancient maſs of it is incloſed between two bodies of lava of a more modern origin. Theſe compoſe the rocks on which Caſtel d'Aci is ſituated, and which lie under the ſoil of the adjacent country. Beyond that city are the immenſe plains of the lower part of Etna. Theſe gradually riſe till they reach the ſummit, which is hid among the clouds. The promontory is almoſt entirely compoſed of baſaltes, the interſtices of which are filled up with a yellowiſh matter, which ſeems to be a clay nearly of the ſame nature with that formerly taken notice of in the iſland of La Trizza, it alſo covers the maſs of baſaltes, and has produced both the ſuperior and anterior parts of the promontory. Here our author ſaw a number of women employed in waſhing webs of cloth in the ſea; and takes notice of the dexterous method they have of lifting it up in folds, and packing it on their heads in bundles without receiving any aſſiſtance. At the foot of this promontory are many curious baſaltic rocks.

15 Great quantity of baſaltes found on Etna.

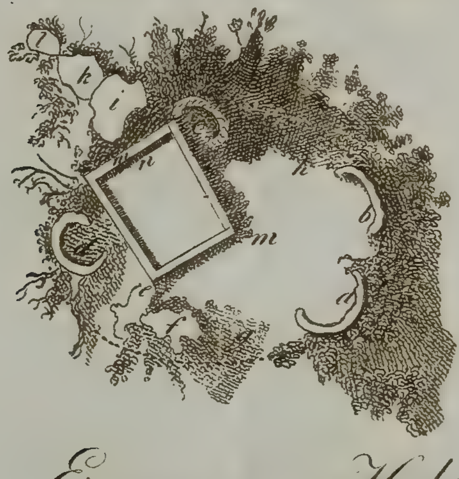
All along the eaſtern ſide of Mount Etna the ſoil is broken, but filled with beautiful varieties of baſaltes, highly worthy of obſervation. Indeed, according to our author's opinion, there is no volcano in Europe ſo rich as Etna in baſaltes, nor where ſo many curious figures of it are to be ſeen.

16 Mr Houel's journey to the great cheſnut-tree.

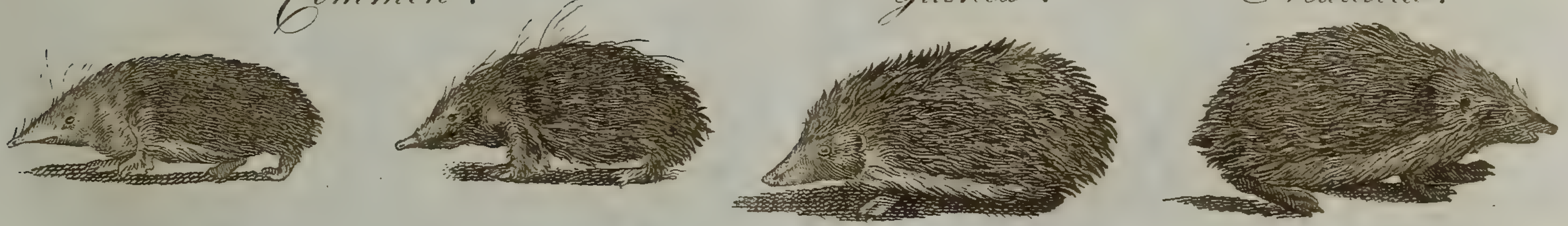
Mr Houel having ſpent ſome more time in viſiting the baſaltic columns around the foot of the mountain, ſet out from Aci to viſit the famous cheſnut-tree, mentioned under the article ÆTNA, and which is known in that country by the name of *The cheſnut-tree for an hundred horſes*. In his way thither he paſſed through the villages of Fortezza, Mangamo, St Leonardo, St Matteo, and La Macchia. The landſcapes of each of theſe places by itſelf are extremely beautiful; but the country between them is a frightful wild deſart, preſenting to the eye nothing but extenſive plains of black lava, which at a diſtance have the appearance of vaſt quantities of pit-coal. The roads became rougher as they



Plan of the Tree.



Erinaceus or Hedgehog.



Common. Giunea. Malacca.

J. Trenchard sculp.

they advanced; but the adjoining fields aſſumed a more ſmiling aſpect. The reaſon of this is, that the torrents of lava (by which the plains are rendered unfit for vegetation for a great number of years) have rolled rapidly down the more ſteep ſides of the mountain without deſtroying the fertility of the ſoil.

17 Great numbers of cheſnut-trees cultivated on this ſide of Etna.

18 Particular account of the great tree.

Travelling through very difficult roads, and often incommoded with dangerous precipices, our author at laſt arrived at the celebrated cheſnut-tree, which was the chief object of this journey. He obſerves, that all over this ſide of the mountain the cheſnut trees thrive very well, and are carefully cultivated by the inhabitants. They are worked into hoops for caſks, and a conſiderable trade is carried on in this article. The great one which he came to viſit, exceeds the ſize of other trees ſo much that it cannot fail to excite the greateſt admiration. It has its name from the following circumſtance. Jean of Arragon ſpent ſome time in Sicily on her way from Spain to Naples: While here ſhe viſited Mount Etna, attended by her principal nobility; and happening to be overtaken by a ſtorm, they took ſhelter under this tree, whoſe branches were ſufficiently extenſive to cover them all. By others, however, this ſtory is treated as a mere fable.

19 An houſe and oven built in the hollow of it.

According to our author's account, this cheſnut tree, is 160 feet in circumference, but quite hollow within: which, however, affects not its verdure; for the cheſnut tree, like the willow, depends upon its bark for ſubſiſtence, and by age loſes its internal part. As the cavity of this enormous maſs is very conſiderable, the people have built an houſe in it, where they have an oven for drying nuts, almonds, and cheſnuts, &c. of which they make conſerves. They frequently ſupply themſelves with wood from the tree which incircles their houſe, ſo that it ſeems likely, in a ſhort time to go to ruin through the ingratitude and thoughtleſſneſs of its inhabitants.

20 Is not compoſed of a number of trees grown together.

Plate CLXXXV

It has been thought that this tree was compoſed of a number of others grown together; but our author is of a different opinion. In deſcribing it particularly, however, we muſt ſeparate it from the trunks *i, k, l,* (on the plan), which properly belong to three other trees. The dotted line, and the letters *a, b, c, d, e, f, g,* mark out the true circumference of the tree we ſpeak of. The parts of that circumference are not all contiguous, ſeveral pieces having been taken away from the places marked *g* and *n,* between which the houſe ſtands. In other places the bark is rent aſunder; but, ſays our author, "by a natural motion, the divided parts ſeeking to reunite, or rather to ſhelter themſelves from the action of the external air, are bent inwards ſo as to form the circular arcs *a, b, c, d,* which may indeed be taken for ſo many different trees, though they appear properly to belong to the ſame trunk."

21 Other trees of vaſt dimenſions.

Beſides this, there are abundance of other trees in the neighbourhood very remarkable for their ſize. Our traveller was ſhown a number of young trees of the ſame ſpecies, all very beautiful and ſtraight, and almoſt as ſmooth as poliſhed marble. One of theſe was 38 feet in circumference, and there were a number of others nearly of the ſame ſize. Among theſe there were ſeven ſtanding together, which have received the name of the *ſeven brethren.* Another is denominated *the ſhip,* from the general figure of its top, which has ſome ſlight reſemblance to a ſhip. Its diameter is 25 feet, ſo that the circumference cannot be leſs than 75. In theſe extenſive foreſts, however, there are cheſnut trees of every age and ſize.

22 Snow grotto deſcribed.

23 Foreſt of pines in the way to it.

Our author's next viſit was paid to a ſnow grotto, being one of thoſe magazines where that article, ſo neceſſary in the hot climate of Sicily, is preſerved for uſe. In his way thither he viſited the foreſt of pines; which is ſo much ſurrounded by rocks and precipices, that it is ſcarce acceſſible; and vaſt numbers of the trees are dying of old age. Some of the neighbouring peaſants, however, will now and then attempt to carry them off. Our author ſaw one of them at this work. It was drawn by oxen, who were yoked to it by a chain connected with the beam of an iron cramp. But the extreme roughneſs of the road made the tree leap and bound in ſuch a manner, that the poor creatures were every moment in danger of having their legs broken, or being hurried over precipices along with their driver; accidents which happen not unfrequently, and which render this occupation leſs generally practiſed than otherwiſe it would be.

24 How the ſnow is prevented from melting during exportation.

The ſnow grotto is but lately formed by the action of the waters under the beds of lava, and carrying away the ſtratum of pozzolana below them. It is ſituated on a mountain named *Finocchio,* which though of very conſiderable ſize, is only a protuberance on the ſide of Etna. It has been repaired in the inſide at the expence of the knights of Malta, who have hired this as well as ſeveral other caverns in the mountain for the purpoſe of holding ſnow, which they have ſtill more occaſion for in their iſland than the inhabitants of Sicily. There are two openings above, at which they throw in the ſnow; and flights of ſteps have been cut to theſe as well as to the internal parts. A conſiderable extent of ground is levelled and incloſed with high walls above the grotto: ſo that when the wind, which at this elevation blows with great violence, carries the ſnow down from the higher parts of the mountain, it is ſtopped and detained by the walls of this incloſure. It is then thrown into the grotto, where the thickneſs of the beds of lava which cover it prevents any impreſſion from the ſummer-heat. When the ſeaſon for exportation comes on, the ſnow is put into large bags, and preſſed into them as cloſe as poſſible. Thus it is rendered compact and heavy, and likewiſe runs leſs riſk of being affected by the heat. It is then carried out upon men's ſhoulders, and conveyed to the ſhore on mules. Before it is put into the bags, the lumps of ſnow are carefully wrapped up in leaves, which is another preſervative; at the ſame time that the freſh congelation of the little which melts, unites the maſſes ſo together, that our author informs us he has ſeen pieces of the ſnow preſerved in this manner which looked like the faireſt and moſt tranſparent cryſtal.

25 Account of mount Roſſo.

Our author's next excurſion was to Mount Roſſo, or the Red Mountain, which is one of the mouths of Etna, and through which it diſcharges from time to time great quantities of lava, ſand, aſhes, &c. It is the moſt celebrated of all the numerous mouths which have opened on the ſide of the mountain, though it has become ſo noted only for having poured forth the matter of the great eruption in 1669, and which is the moſt remarkable of any recorded in hiſtory.

"When a new crater (ſays our author) is formed

26
New craters how formed.

on mount Etna, it is always in conſequence of ſome ſhock that is powerful enough to break the arches of its caverns. Doubtleſs it is inconceivable that there ſhould be any agent endowed with ſuch force; but when ſuch a fracture is once made, it is neceſſarily very large, and the ſurface of the ground above cannot but be broken in ſeveral different places at conſiderable diſtances from one another. The matter which is diſcharged always iſſues from the principal opening and thoſe adjoining to it. None of theſe mouths, however, continue open, excepting that which is directly in the line in which the matter is diſcharged; the lava ſoon choaking up thoſe which are in a more oblique direction."

Our author went down one of theſe openings with torches; but could not reach the bottom, and was obliged to return on account of the extreme cold. The deſcent was extremely difficult, and became more ſo in proportion as he advanced. This crater is of an oval form, and the opening through which he deſcended was in one extremity: but he was tempted to think that the crater which riſes above it had been formed of matter diſcharged by another mouth; or perhaps it might have had a more centrical opening, through which the ſtones, ſand, &c. which form the crater, were diſcharged.

Four of the mouths of this mount appear to be compoſed of a reddiſh pozzolana, which has procured it the name of the *Red Mountain;* but when we aſcend the pyramids, or rather funnels which they form, we find them compoſed of different kind of layers of ſand. Some of theſe are of a bluiſh grey colour, others of a fine yellow, and ſome of a kind of green formed by a mixture of grey and yellow, while others are of a red colour. A great number of ſmall cryſtals, black ſchoerls, and granites are found among them, as well as pieces of ſcoria, which had been diſcharged by the volcano in the form of a thick and glutinous matter. All theſe mouths have internally the form of a funnel, and their ſhape is nearly that of a mutilated cone or round pyramid. This is the natural and unavoidable conſequence of the perpendicular fall of the pulveriſed matter which the volcano diſcharges from the orifice at the bottom. The ſides of the craters are not all of one height; the parts to the eaſt and weſt being conſiderably higher than the intermediate ſummits, becauſe the currents of the aſhes paſſed alternately from eaſt to weſt, and fell upon theſe ſides in greater quantities than on the others; which circumſtance has given to this volcano the appearance of having two ſummits.

27
Convent of Nicoloſi deſcribed.

28
Grotto of the goats deſcribed.

29
Regione Sylvoſa deſcribed.

M. Houel, having finiſhed his obſervations on Monte Roſſo, returned to the convent of Nicoloſi, which is now only an houſe for the entertainment of travellers. The Benedictines of Catana, to whom it belongs, viſit this place only when in an ill ſtate of health, as the purity of the air renders it very ſalutary to the human conſtitution. A ſolitary brother, however, reſides here to take care of the houſe, and to ſuperintend the cultivation of the neighbouring plains. Thoſe fathers once poſſeſſed an extenſive and very fertile tract of land in this neighbourhood; but the eruptions of Etna have rendered it totally incapable of cultivation. This houſe ſtands at a very conſiderable height, being no leſs than 2496 feet above the level of the ſea. Setting out from this place three hours before day, our traveller directed his courſe towards the grotto of the goats. In his way thither, he paſſed over ſeveral plains of lava, ſome of them ancient and others more modern: but the roads were extremely rough and dangerous; or rather, as our author expreſſed himſelf, there was no track or path meriting the name of a road. In two hours they reached the Regione Sylvoſa, where an immenſe foreſt ſurrounds the mountain, and which has undoubtedly been planted by the hand of nature: for the ground there is ſo high, ſo full of precipices, and ſo entirely uninhabitable, that no human being could ever think of making plantations on it; nor is it to be ſuppoſed that the winds could take up ſeeds from the plains to ſow them on ſuch a lofty ſituation.

30
Beautiful appearance of the foreſts of Etna.

Theſe majeſtic foreſts of Etna afford a ſingular ſpectacle, and bear no reſemblance to thoſe of other countries. Their verdure is more lively, and the trees of which they conſiſt are of a greater height. Theſe advantages they owe to the ſoil whereon they grow; for the ſoil produced by volcanoes is particularly favourable to vegetation, and every ſpecies of plants grows here with great luxuriance. In ſeveral places where we can view their interior parts, the moſt enchanting proſpects are diſplayed. The hawthorn trees are of an immenſe ſize. Our author ſaw ſeveral of them of a regular form, and which he was almoſt tempted to take for large orange-trees cut artificially into the figures they repreſented. The beeches appear like as many ramified pillars, and the tufted branches of the oak like cloſe buſhes impenetrable to the rays of the ſun. The appearance of the woods in general is exceedingly pictureſque, both by reaſon of the great number and variety of the trees, and the inequality of the ground, which makes them riſe like the ſeats in an amphitheatre, one row above another; diſpoſing them alſo in groups and glades, ſo that their appearance changes to the eye at every ſtep: and this variety is augmented by accidental circumſtances, as the ſituation of young trees among others venerable for their antiquity; the effects of ſtorms which have often overturned large trees, while ſtems ſhooting up from their roots, like the Lernæan hydra, ſhow a number of heads newly ſprung to make up that which was cut off.

31
Grotto of the goats, how formed.

About three hours after the departure of our travellers from St Nicholas, they reached the grotto of the goats. It is formed by a bed of lava, which having flowed over a pile of ſand and pozzolana while in a fluid ſtate, ſettled and cooled in that ſituation; and the ſand or pozzolana being afterwards carried off by the filtration of water through the lava, a void ſpace has been left, which the torrents have gradually enlarged to its preſent ſize.

This grotto ſtands about 5054 feet above the level of the ſea, according to the calculations of M. de Sauſſure. It affords a retreat for thoſe travellers who viſit the ſummit of Etna, who generally refreſh themſelves by taking a repaſt and making a fire at the entry, for which there is plenty of dry wood at hand; while the ſand ſerves for a bed to repoſe on. Here our author and his company ſupped, and about midnight ſet off for the ſummit. They had the advantage of the moon-light; and our author adviſes all thoſe who intend to viſit the top of Etna to take ſuch a time for their journey as may enable them to enjoy this advantage.

32 Account of the higheſt parts of Etna.

tage. As they advanced beyond the grotto of the goats the trees became gradually thinner. In a ſhort time they were ſo thin, that they might readily be counted; and, proceeding ſtill farther, only a very few were ſeen ſcattered here and there, whoſe beauty and ſize were diminiſhed ſeemingly in proportion to their numbers. A few clumps of trees and ſome tufts of odoriferous herbs were now only to be ſeen; and in a little time theſe alſo became thinner, aſſuming a withered or ſtunted appearance. Then they are nothing but the languiſhing remains of an abortive vegetation; and a few paces further not even this appeared, the eye being preſented only with barren ſand.

33 Snowy and barren region deſcribed.

Having now got above the region of the trees, they entered the third, which our author denominates the region of ſnow and ſterility. The wind became more briſk and keen as they advanced, ſo that they could ſcarce keep their hats upon their heads; and our author loſt his, though tied on with an handkerchief. Here they were frequently obliged to croſs conſiderable ſtreams of water formed by the melting of the ſnow. In general the ſurface was ſufficiently hard to bear them; but our author's mule once ſunk up to her belly, and was not extricated without great difficulty.

34 Plain on the ſummit of Etna.

33 Wind exceſſively violent here.

37 Extenſive and glorious proſpect from the ſummit.

Having at laſt overcome all difficulties, they arrived at the large plain on the ſummit of Etna, and in the midſt of which is the crater of the volcano. It is entirely compoſed of lava, cinders, ice, and ſnow; nevertheleſs is ſtyled, ironically as our author thinks, *Monte Friumente*. Here the wind continued to blow with exceſſive violence; and our author informs us, that in order to have any notion of its keenneſs, we muſt be accuſtomed to feel it on ſome very elevated ſtation, as it is impoſſible to judge from what we feel at inferior altitudes. They took ſhelter behind a lump of lava, the only one which appeared in the whole plain, and, which our author ſays, would ſeem deſigned expreſsly for the ſhelter of travellers. Here they lay, wrapped up in their cloaks, for an hour; but as ſoon as it was day, ſo that they could diſtinguiſh the place where the ſun was to riſe, they got up and advanced towards the ruins of the building known by the name of the *Philoſopher's Tower*. The wind ſtill blew ſo violently, that after an effort of four minutes they fell down exhauſted; but the extreme cold obliging them again to get up, they made a ſecond attempt; and after ſeveral intermiſſions of this kind, at laſt accompliſhed their deſign. They were ſurpriſed, however, to find nothing but the corner of a wall not more than two feet high, conſiſting of two rows of unpoliſhed ſtones; great part of it having been probably burried by the ſand and other matters diſcharged by the mountain. Here, being ſheltered from the wind, and the day advancing, they began to enjoy the glorious proſpect which every moment became more extenſive. At the riſing of the ſun, the horizon was ſerene, without a ſingle cloud. "The coaſt of Calabria (ſays our author) was as yet undiſtinguiſhable from the adjoining ſea; but in a ſhort time a fiery radiance began to appear from behind the Italian hills, which bounded the eaſtern part of the proſpect. The fleecy clouds, which generally appear early in the morning, were tinged with purple; the atmoſphere became ſtrongly illuminated, and, reflecting the rays of the riſing ſun, appeared filled with a bright effulgence of flame. The immenſe elevation of the ſummit of Etna made it catch the firſt rays of the ſun's light, whoſe vaſt ſplendor, while it dazzled the eyes, diffuſed a moſt cheriſhing and enlivening heat, reviving the ſpirits, and diffuſing a pleaſant ſenſation throughout the ſoul. But though the heavens were thus enlighted, the ſea ſtill retained its dark azure, and the fields and foreſts did not yet reflect the rays of the ſun. The gradual riſing of this luminary, however, ſoon diffuſed his light over the hills which lie below the peak of Etna. This laſt ſtood like an iſland in the midſt of the ocean, with luminous points every moment multiplying around, and ſpreading over a wider extent with the greateſt rapidity. It was as if the univerſe had been obſerved ſuddenly ſpringing from the night of non-exiſtence. The tall foreſts, the lofty hills, and extenſive plains of Etna, now preſented themſelves to view. Its baſe, the vaſt tracts of level ground which lie adjacent, the cities of Sicily, its parched ſhores, with the daſhing waves and vaſt expanſe of the ocean, gradually preſented themſelves, while ſome fleeting vapours, which moved ſwiftly before the wind, ſometimes veiled part of this vaſt and magnificent proſpect." In a ſhort time every thing was diſplayed ſo diſtinctly, that they could plainly recognize all thoſe places with which they were before acquainted. On the ſouth were ſeen the hills of Camerata and Trapani; on the north, the mounts Pelegrino and Thermini, with the celebrated Enna once crowned with the temples of Ceres and Proſerpine. Among theſe mountains are ſeen a great many rivers running down and appearing like as many lines of glittering ſilver winding through a variety of rich and fertile fields, waſhing the walls of 20 cities, while their banks were otherwiſe filled with villages, hamlets, &c. riſing among the ruins of the moſt illuſtrious republics of antiquity. On the ſouth and north were obſerved the rivers which bound by their courſe the vaſt baſe of mount Etna, and afford a delightful proſpect to the eye; while at a much greater diſtance were ſeen the iſles of Lapari, Alicudi, Felicocide, Parinacia, and Stromboli.

38 Philoſopher's tower deſcribed.

39 Deſcription of the great crater.

Having enjoyed for ſome time the beauty of this magnificent proſpect, our author ſet about making a draught of the place from which the view was taken; and at length acccompliſhed it, notwithſtanding the great impediments he met with from the wind. Among the objects which he delineated on this occaſion, the Philoſopher's Tower was one. It ſeems, he ſays, not to be very ancient; neither the materials of which it conſiſts, nor the mode of architecture, bearing any reſemblance to thoſe of the Greeks and Romans. The ſurrounding plains ſeems to conſiſt entirely of a black ſand intermixed with pieces of ſcoria, which have been formerly thrown out by the volcano. Beyond that plain, which riſes gently, appears a cone, the ſummit of which is the volcanic crater. When viewed from the ſouth ſide, on which they ſtood, this crater ſeems to conſiſt of a number of ſmall hills. Into theſe it was broken by the emiſſion of the boiling torrent in the year 1755. When diſcharged from the crater, theſe waters ſpread towards the right, and at the diſtance of a mile eaſtward fell in a caſcade from a prodigious height.

The violence of the wind beginning now to abate a little, the travellers ſet out for the very ſummit, in order to take a view of the great crater; in which journey (our author ſays) it would be difficult to make people, who have never engaged in ſuch enterpriſes, comprehend all the obſtacles they had to encounter. This cone (the little mountain mentioned by Sir William Hamilton) is compoſed of aſhes, ſand, and pozzolano, thrown up at different times by the volcano. The materials are ſo looſe, that the adventurous traveller ſinks about mid leg at every ſtep, and is in conſtant terror of being ſwallowed up. At laſt, when the ſummit is reached, the ſulphureous exhalations, which are continually emitted from the pores of the mountain, threaten ſuffocation, and irritate the fauces and lungs in ſuch a manner as to produce a very troubleſome and inceſſant cough. The looſeneſs of the ſoil, which gives way under the feet, obliges the traveller, every now and then, to throw himſelf flat on his belly, that ſo he may be in leſs danger of ſinking. In this poſture our author viewed the wide unfathomable gulph in the middle of the crater; but could diſcover nothing except a cloud of ſmoke, which iſſued from a number of ſmall apertures ſcattered all around, and accompanied with a kind of noiſe. Another and more dreadful ſound, however, iſſues from the bowels of the volcano, and which, according to our author, "ſtrikes the heart with terror, ſo that all the ſtrength of reaſon is neceſſary to prevent the obſerver from flying with precipitation from ſuch a dreadful place." Several travellers who had viſited this cone before him, were ſo terrified by theſe dreadful ſounds, that they fled with the utmoſt haſte till they arrived at the foot of the mountain.

40
Deſcription of the horrid noiſes continually iſſuing from the burning gulph.

Our author compares theſe ſounds to a diſcharge of cannon in the wide abyſs; the noiſe of which is rebellowed throughout all the caverns, and produce a ſound perhaps the moſt alarming that can be imagined; and during the ſhort ſpace in which he liſtened, ſeveral of theſe diſcharges were heard to follow one another almoſt uninterruptedly.

This dreadful noiſe, our author, with very great probability, ſuppoſes to be occaſioned by the exploſions of the internal fire, or, as he calls it, the *focus* of the volcano; which, ſtriking againſt the ſides of theſe immenſe caverns, the ſounds produced are re-echoed through their cavities, and probably multiplied in an extraordinary manner; ſo that what would be only a ſlight exploſion in the open air, occaſions a ſound more tremendous than the loudeſt thunder. To ſuch as are convinced of this, and have ſufficient courage to reſiſt the firſt impreſſions which theſe ſounds muſt unavoidably occaſion, they will in a ſhort time not only appear exceedingly ſublime, but, by their variety, even ſomewhat agreeable. "They enable us (ſays our author) to form ſome conception of the ſpace through which they muſt paſs before they reach the ear, and of the vaſt extent and width of the hollows of the mountain."

41
Impoſſible to walk round the crater.

Having for ſome time contemplated this awful ſpectacle, our author wiſhed to meaſure the crater by walking round it; but found this impoſſible. On the north ſide the ſurface is hard and ſmooth, the aſhes having been ſo far diſſolved by the moiſture depoſited by the ſmoke as to cement into one uniform maſs. This is ſometimes diſſolved even into a fluid ſtate, in ſuch a manner as to run down the ſides of the cone; ſo that after ſeveral attempts, he was at laſt obliged to abandon his deſign.

Pl. CLXXXIV.

Fig. 2. exhibits a view of the crater of Etna taken on the brink of the eaſt ſide. The fore-ground (*aa*) of the figure is one diviſion of the crater. Beyond it are two eminences *b* and *c*, higher than that on which ſome human figures are repreſented. All the three form a triangle nearly equilateral; but, when viewed from any conſiderable diſtance, only two of them can be ſeen; for which reaſon the Silicians have termed the mountain *bicornæ*, or double-horned.

42
Explanation of the figure of the crater.

The ſmoke, as repreſented in the figure, iſſues from all quarters, either from chinks or holes ſcattered over the whole crater. But the ſituation of the principal mouth is in the midſt of the three eminences. Its diameter, when our author viſited this mountain, was only about 60 feet, and ſo filled with ſmoke that nothing remarkable could be diſcovered. From the height *d*, the rock ſituated on the left ſide of the point, and on which the human figures are repreſented, all the way to the rock *e* on the right, the diſtance is no more than 900 feet. Our author obſerved that the cone is not exactly in the middle of the plain, but is ſituated more towards the north than the ſouth. He did not attempt to croſs the central valley, *f*, on account of the looſeneſs of the ground, and that there was no object apparently worthy of the riſk he muſt run in ſo doing. At the neareſt view he took, it was only obſerved that there was ſnow lying in ſeveral parts of it, though the heat which otherwiſe prevailed ſeemed to be very intenſe.

The ſmoke which iſſues from the crater of Etna is generally carried in a direction from ſouth to north; and, as it brings along with it a conſiderable quantity of water, the latter, condenſed by the cold winds, runs down the ſide of the mountain in plentiful ſtreams, and often leaves pretty permanent marks of its courſe. In this manner he accounts for the great eruption of water, in 1755, which he ſuppoſes to have been occaſioned only by an unuſual quantity of water falling into the burning focus of the mountain, there rarefied into ſteam, and afterwards condenſed by the coldneſs of the atmoſphere.

43
Eruption of water in 1755 accounted for.

Like other travellers to mount Etna, this gentleman found the wind blowing from the ſouth; and he is of opinion, that a ſouth wind blows here more frequently than any other, as he did not obſerve any channels cut by the water on any other ſide than the north. He had ſeveral opportunities of making this obſervation, having frequently viſited the top of Etna, and always paid attention to the crater. The ſand on the eaſt and weſt ſides was always looſe, while that on the north was compacted into a ſolid body. The three ſummits were of a later date than the reſt of the crater, having been probably thrown up by ſome eruption which had burſt it aſunder. The black ſpots on the fore-ground repreſent a number of hillocks about the ſize of mole hills, from which a ſulphureous vapour conſtantly iſſues, and by which the adjacent ground is tinged of an ochery colour. This vapour iſſues from the crevices with a kind of hollow whiſtling noiſe; which with the volcanic thunder, ſmoke, and noxious ſmell, render it very diſagreeable to ſtay here even for a few moments.

44
South wind generally prevalent on the top of Etna.

The ſmoke is repreſented in the figure preciſely as it did on the day that he aſcended, which was very warm. But it does not always riſe in this manner; for when the cold is very intenſe, it collects into a body, and thickens around the edge of the crater: on which occaſions it is condenſed into water, which diffuſes itſelf around the edge of the crater, and mixing with the aſhes converts them into a kind of clay.

45 Intenſe cold produced by a ſouth wind.

The cold on the top of this mountain is ſo intenſe, that travellers very often find their clothes inſufficient to protect them; and it is remarkable that ſuch intenſe cold is always produced by a ſouth wind. The day that our author took his draught, the wind blew faintly from the north.

46 Account of the ſtrata at the foot of mount Etna.

The baſe of mount Etna, according to Mr Houel's obſervations, conſiſts of alternate layers of lava and marine ſubſtances, which have been depoſited ſucceſſively one upon another. Theſe alternate layers extend to an unknown depth. They muſt indeed go as far down as the level of the ſtratum of lava which was diſcharged by the volcano at its firſt origin. The laſt depoſited by the ſea is a range of calcareous mountains of a conſiderable height, and which are placed on a baſis of lava. Beneath that layer of lava is another of ſea-pebbles, which are well known to be rounded by their attrition againſt one another by the motion of the waves. This layer is of conſiderable depth, and lies upon a yellowiſh rock conſiſting of a ſpecies of indurated ſand. The river Simeto flows over this rock, which it has cut away conſiderably. That part which is at preſent the bed of the river is much higher than the baſe of Etna that is on a level with the ſea; and not the leaſt thing occurs to ſuggeſt an idea of what has been the primary baſe of the volcano. The marine ſubſtances, already taken notice of, lie nearly in an horizontal direction, more or leſs ſo according to the nature of the ſurface on which they have been depoſited.

47 Great number of ſprings on Mount Etna.

Etna abounds very much with ſprings, fountains, and even rivers of conſiderable magnitude. Our author has computed, that if all the water flowing down the ſides of this mountain were collected, it would fill the channel of a river 36 feet broad and 6 in depth. Many of the ſprings afford fine ſalt; ſome are very pure, and others are impregnated with noxious ſubſtances; while others are remarkable for their uſe in dyeing particular colours.

48 Whence ſuch a large quantity of water is derived.

"It is worthy of notice (ſays our author), that ſtreams of water, ſome of them more copious, others more ſcanty, are ſeen to iſſue at all different degrees of height, from the baſe to the ſummit of the mountain. Even in ſummer, when very little rain falls for three or four months, or when perhaps for that ſpace there is no rain at all, and for three of which at leaſt there is not an ounce of ſnow melted; even then a great number of rivulets continue to flow down the ſides of Etna; and at the ſame time a number of ſtreams, external and ſubterraneous, each of them ſeveral feet wide, are, according to the accounts of the country people, plentifully ſupplied with water.

"As the trifling quantity of ſnow which is melted here even in the midſt of ſummer, and the ſtill ſmaller quantity depoſited by the clouds, would be totally inſufficient to ſupply thoſe ſtreams, and muſt be all abſorbed by the earth for the ſupport of vegetation, thoſe ſtreams muſt proceed from ſome other cauſe, whoſe effects are more copious and permanent.

49 Produced by the internal evaporation of the mountain.

This cauſe is the evaporation of thoſe aqueous particles which ariſe from the conſtant ebullition at the bottom of the volcanic focus. Theſe iſſuing out at the great crater, and at innumerable chinks in the ſides of the mountain, are ſoon condenſed by the cold of that elevated region of the atmoſphere, and, percolating through the earth, give birth to thoſe numerous ſtreams in queſtion.

"A volcano, according to my ideas, cannot ſubſiſt without water; nor can water occupy a place in any volcanic focus without being changed into vapour. But before that water can make its appearance, except in the form of ſmoke, it muſt have filled the whole volcanic cavern, and muſt have been forcibly preſſed by the action of the fire againſt its ſides: it muſt next have condenſed, and aſſumed the form of water; in which ſtate it muſt have penetrated through the inclined layers of ſand and pozzolano which intervene betwixt the different ſtrata of lava; for theſe ſtrata lie one above another, and are full of chinks, in ſuch a manner as to preſent to the eye an appearance pretty much reſembling that of the inſide of a tiled roof."

50 Eruptions of Etna more frequent anciently than now.

It has been a queſtion, Whether the eruptions of mount Etna were more frequent in ancient than in modern times? At firſt it ſeems impoſſible to give a preciſe anſwer to ſuch a queſtion; but when we conſider, that the matter in the volcanic focus was then greater in quantity than at preſent, in proportion to the ſpace which it occupied: that the cavities were then ſooner filled with vapour; and that the centre of the focus was then leſs remote, we will not heſitate to pronounce, that in earlier times the eruptions were more frequent as well as more copious.

51 Liſt of eruptions from the earlieſt periods.

We ſhall cloſe this article with an enumeration of all the different eruptions from mount Etna which are found upon record.

1. The firſt mentioned in hiſtory, is that of which Diodorus Siculus ſpeaks, but without fixing the period at which it happened. That eruption, ſays he, obliged the Sicani, who then inhabited Sicily, to forſake the eaſtern, and retire to the ſouthern, part of the iſland. A long time after that the Sicilians, a people of Italy, migrated into Sicily, and took up their abode in that part of the iſland which had been left deſert by the Sicani.

2. The ſecond eruption known to have iſſued from this volcano, is the firſt of the three mentioned by Thucydides; of none of which he fixes the date, mentioning only in general, that from the arrival of the firſt Greek colonies that ſettled in Sicily (which was in the 11th Olympiad, and correſponds to the 734th year before the Chriſtian era), to the 88th Olympiad, or the year 425th before Chriſt, Etna at three different times diſcharged torrents of fire. This ſecond eruption happened, according to Euſebius, in the days of Phalaris, in the 565th year before the Chriſtian era. The aſſertion of Euſebius is confirmed by a letter from that tyrant to the citizens of Catania, and the anſwer of the Catanians (if, after Bentley's Diſſertations againſt their authenticity, any credit be due to the epiſtles of Phalaris). But Diodorus gives both theſe pieces.

3. The third, which is the ſecond of the three mentioned by Thucydides, happened in the 65th Olympiad, in the 477th year before the Chriſtian era, when Xantippus was archon at Athens. It was in this ſame year the Athenians gained their boaſted victory over Xerxes's general Mardonius near Platæa. Both the eruption of the volcano and the victory of the Athenians are commemorated in an ancient inſcription on a marble table which ſtill remains. An ancient medal

exhibits a repreſentation of an aſtoniſhing deed to which that eruption gave occaſion. Two heroic youths boldly ventured into the midſt of the flames to ſave their parents. Their names, which well deſerved to be tranſmitted to future ages, were Amphinomus and Anapius. The citizens of Catania rewarded ſo noble a deed with a temple and divine honours. Seneca, Silius Italicus, Valerius Maximus, and other ancient authors, mention the heroiſm of the youths with juſt applauſe.

4. The fourth eruption, the third and laſt of thoſe mentioned by Thucydides, broke out in the 88th Olympiad, in the 425th year before the Chriſtian era. It laid waſte the territory of Catania.

5. The fifth is mentioned by Julius Obſequens and Oroſius, who date it in the conſulſhip of Sergius Fulvius Flaccus and Quintus Calpurnius Piſo, nearly 133 years before the Chriſtian era. It was conſiderable; but no peculiar facts are related concerning it.

6. In the conſulſhip of Lucius Emilius Lepidus and Lucius Aurelius Oreſtes, in the 125th year before the Chriſtian era, Sicily ſuffered by a violent earthquake. Such a deluge of fire ſtreamed from Etna as to render the adjoining ſea into which it poured abſolutely hot. Oroſius ſays, that a prodigious quantity of fiſhes were deſtroyed by it. Julius Obſequens relates, that the inhabitants of the iſles of Lipari eat ſuch a number of thoſe fiſhes, as to ſuffer in conſequence of it, by a diſtemper which proved very generally mortal.

7. Four years after the laſt mentioned, the city of Catania was deſolated by another eruption not leſs violent. Oroſius relates, that the roofs of the houſes were broken down by the burning aſhes which fell upon them. It was ſo dreadfully ravaged, that the Romans found it neceſſary to grant the inhabitants an exemption from all taxes for the ſpace of ten years, to enable them to repair it.

8. A ſhort time before the death of Cæſar, in the 43d year before Jeſus Chriſt, there was an eruption from mount Etna. Livy mentions it. It was not diſtinguiſhed by any thing extraordinary. It was afterwards conſidered as an omen of the death of Cæſar.

9. Suetonius, in the life of Caligula, mentions an eruption from mount Etna which happened in the 40th year after the Chriſtian era. The emperor fled on the very night on which it happened, from Meſſina, where he at that time happened to be.

10. Carrera relates, that in the year 253, there was an eruption from mount Etna.

11. He ſpeaks of another in the year 420; which is alſo mentioned by Photius.

12. In the reign of Charlemagne, in the year 812, there was an eruption from Etna. Geoffroy of Viterbo mentions it in his Chronicle.

13. In the year 1169, on the 4th of February, about day-break, there was an earthquake in Sicily, which was felt as far as Reggio, on the oppoſite ſide of the ſtrait. Catania was reduced by it to ruins; and in that city more than 15,000 ſouls periſhed. The biſhop, with 44 monks of the order of St Benedict, were buried under the ruins of the roof of the church of St Agatha. Many caſtles in the territory of Catania and Syracuſe were overturned; new rivers burſt forth, and ancient rivers diſappeared. The ridge of the mountain was obſerved to ſink on the ſide next Taormina. The ſpring of Arethuſa, ſo famous for the purity and ſweetneſs of its waters, then became muddy and brackiſh. The fountain of Ajo, which riſes from the village of Saraceni, ceaſed to flow for two hours; at the end of which the water guſhed out more copiouſly than before. Its waters aſſumed a blood-colour, and retained it for about an hour. At Meſſina, the ſea, without any conſiderable agitation, retired a good way within its ordinary limits; but ſoon after returning, it roſe beyond them, advanced to the walls of the city, and entered the ſtreets through the gates. A number of people who had fled to the ſhore for ſafety were ſwallowed up by the waves. Ludovico Aurelio relates that the vines, corn, and trees of all ſorts, were burnt up, and the fields covered over with ſuch a quantity of ſtones as rendered them unfit for cultivation.

14. Twelve years after this, in the year 1181, a dreadful eruption iſſued from Etna on the eaſt ſide. Streams of fire ran down the declivity of the mountain, and encircled the church of St Stephen, but without burning it.

Nicholas Speciale, who relates, though he did not ſee this event, was witneſs to another conflagration on Etna 48 years after this, in the year 1329 on the 23d of June, of which he has given a deſcription.

15. On that day, ſays he, about the hour of veſpers, Etna was ſtrongly convulſed, and uttered dreadful noiſes; not only the inhabitants of the mountain, but all Sicily, were ſtruck with conſternation and alarm. On a ſudden, a terrible blaze of fire iſſued from the ſouthern ſummit, and ſpread over the rocks of Mazarra, which are always covered with ſnow. Together with the fire, there appeared a great deal of ſmoke. After ſun-ſet, the flames and the ſtones that iſſued out with them were ſeen to touch the clouds. The fire making way for itſelf with the moſt furious impetuoſity, burnt up or reduced to ruins all thoſe ſtructures which the piety of former times had conſecrated to the Deity. The earth yawning, ſwallowing up a great many ſprings and rivulets. Many of the rocks on the ſhore of Maſcali were ſhaken and daſhed into the ſea. A ſucceſſion of theſe calamities continued till the 25th of July, when the bowels of Etna were again heard to rebellow. The conflagration of Mazarra ſtill went on unextinguiſhed. The earth opened near the church of St John, called *Il Paparinecca:* In the ſouth ſide fire iſſued from the gap with great violence: to add to the horrors of the day, the ſun was obſcured from morning to evening with clouds of ſmoke and aſhes, as entirely as in an eclipſe. Nicolas Speciale went towards the new-opened crater, to obſerve the fire and the burning ſtones which were iſſuing from the volcano. The earth rebellowed and tottered under his feet; and he ſaw red-hot ſtones iſſue four times ſucceſſively in a very ſhort ſpace from the crater, with a thundering noiſe, the like of which, he ſays, he had never before heard.

In a few days after this, all the adjacent fields were burnt up by a ſhower of fire and ſulphureous aſhes; and both birds and quadrupeds being thus left deſtitute of food, died in great numbers. A great quantity of fiſhes likewiſe died in the rivers and the contiguous parts of the ſea. “ I cannot think (ſays he) that either Babylon or Sodom was deſtroyed with ſuch awful

"ful ſeverity." The north winds, which blew at the time, carried the aſhes as far as Malta. Many perſons of both ſexes died of terror.

16. Scarce had four years elapſed after this terrible event, when Etna made a new exploſion, and diſcharged vollies of ſtones, cauſing the neighbouring fields to tremble. This happened in the year 1333.

17. Forty-eight years after this, on the 25th of Auguſt 1381, an eruption from Etna ſpread its ravages over the confines of the territory of Catania, and burnt up the olive-yards in the neighbourhood of that city.

18. In the year 1444, 63 years after the laſt eruption, a torrent of lava iſſued from Etna and ran towards Catania. The mountain ſhook; and the ſhocks were ſo violent, that ſeveral huge maſſes of rock were broken from its ſummit, and hurled into the abyſs with a tremendous noiſe.

19. After this Etna was ſcarce at reſt for 18 months or 2 years. On Sunday the 25th of September 1446, about an hour after ſun-ſet, an eruption iſſued from the place called *La Pietra di Mazarra*. This eruption was ſoon over.

20. On the following year 1447, on the 21ſt of September, there was another, with a good deal of fire; but this eruption was likewiſe of ſhort duration.

21. Etna now ceaſed to emit fire, and that for a conſiderable time. The neighbouring inhabitants not only aſcended to the ſummit of the mountain, but even, if we may credit accounts, went down into the fiery gulph, and believed the volcanic matter to be now exhauſted: But on the 25th of April 1536, near a century from the ſlight eruption in 1447, a ſtrong wind aroſe from the weſt, and a thick cloud, reddiſh in the middle, appeared over the ſummit of the mountain. At the very ſame inſtant a large body of fire iſſued from the abyſs, and fell with the noiſe and rapidity of a torrent along the eaſtern ſide of the mountain, breaking down the rocks, and deſtroying the flocks and every other animal that was expoſed to its fury. From the ſame crater, on the ſummit of the mountain, there iſſued at the ſame time a ſtream of fire more terrible than the other, and held its courſe towards the weſt. It run over Bronte, Adrans, and Caſtelli. It conſiſted entirely of ſulphur and bitumen. On the ſame day the church of St Leon, which ſtood in a wood, was firſt demoliſhed by the ſhocks of the earthquake, and its ruins after that conſumed by the fire. Many chaſms were opened in the ſides of the mountain; and from thoſe iſſued fire and burning ſtones, which darted up into the air with a noiſe like that produced by a ſmart diſcharge of artillery. Francis Negro de Piazza, a celebrated phyſician, who lived at Lentini, wiſhing to have a nearer view of the eruptions, and to make ſome obſervations which he thought might be of conſequence, was carried off and burnt to aſhes by a volley of the burning ſtones. This conflagration of Etna laſted ſome weeks.

22. In leſs than a year, on the 17th of April 1537, the river Simeto ſwelled ſo amazingly as to overflow the adjacent plains, and carry off the country people and their cattle and other animals. At the ſame time, the country around Paterno, the neighbouring caſtles, and more than 500 houſes, were deſtroyed by the ravages of the river; and moſt of the wood was torn up by the roots by violent blaſts of wind. Theſe ravages of the elements were occaſioned by Etna, which on the 11th of the following month was rent in ſeverable places, diſcloſing fiery gulphs, and pouring out a deluge of fire in more terrible torrents than thoſe of the preceding year. They directed their courſe towards the monaſtery of St Nicholas d'Arena; deſtroyed the gardens and vineyards; and proceeding onwards towards Nicoloſi, burnt Montpellieri and Fallica, and deſtroyed the vineyards and moſt of the inhabitants. When the conflagration ceaſed, the ſummit of the mountain ſunk inwards with ſuch a noiſe, that all the people in the iſland believed the laſt day to be arrived, and prepared for their end by extreme unction. Theſe dreadful diſturbances continued through the whole year, more eſpecially in the months of July and Auguſt, during which all Sicily was in mourning. The ſmoke, the noiſe, and the ſhocks of the earthquake, affected the whole iſland; and if Filotes may be believed, who relates this event, many of the Sicilians were ſtruck deaf by the noiſe. Many ſtructures were demoliſhed; and among others the caſtle of Corleone, though more than 25 leagues diſtant from the volcano.

23. During the ſucceeding 30 years there was no diſturbance of this nature. At the end of that ſpace, Sicily was alarmed by a new eruption from the mountain. Etna diſcharged new ſtreams fire, and covered the adjacent country with volcanic aſhes, which entirely ruined the hopes of the huſbandman.

24. In the year 1579, Etna renewed its ravages; but no particular account of the damage which it did upon this occaſion has been tranſmitted to us.

25. Twenty-five years had elapſed, when Etna, in the month of June 1603, flamed with new fury. Peter Carrera affirms, that it continued to emit flames for the ſpace of 33 years, till 1636, without interruption, but not always with the ſame violence. In 1607, the ſtreams of lava which flowed from it deſtroyed the woods and vineyards on the weſt ſide of the mountain. In 1609, they turned their courſe towards Aderno, and deſtroyed a part of the foreſt del Pino, and a part of the wood called *la Sciambrita*, with many vineyards in the diſtrict Coſterna. Thoſe torrents of lava continued to flow for three months. In the year 1614, a new effort of the ſubterraneous fire opened another crater, from which fire was diſcharged on Randazzo, in the diſtrict called *il Piro*. The fire continued to flame for 10 or 12 years longer.

26. The ſame Peter Carrera relates, that a dreadful conflagration happened in the year 1664, of which he himſelf was witneſs. It happened on the 13th of December and laſted without interruption, but with different degrees of violence, till the end of May 1678. But in 1679 the inhabitants of Nicoloſi were obliged to forſake their houſes, which tumbled down ſoon after they left them. The crater on the ſummit of Etna had not at this time a threatening aſpect, and every thing there continued quiet till the 25th of March: but on the 8th of that month, an hour before night, the air was obſerved to become dark over the village la Pedara and all that neighbourhood; and the inhabitants of that country thought that an almoſt total eclipſe was taking place. Soon after ſun-

ſet, frequent ſhocks of earthquake began to be felt; theſe were at firſt weak, but continued till day-break to become more and more terrible. Nicoloſi was more affected than any other tract of country on that ſide of Etna: about noon every houſe was thrown to the ground; the inhabitants fled in conſternation, and invoking the protection of heaven. On the 10th of March a chaſm ſeveral miles in length, and five or ſix feet wide opened in the ſide of the mountain; from which, about two hours before day, there aroſe a bright light, and a very ſtrong ſulphureous exhalation was diffuſed through the atmoſphere.

About 11 in the forenoon of the ſame day, after dreadful ſhocks of earthquake, a crater was opened on the hill called *des Noiſettes*, from which there iſſued huge volumes of ſmoke, not accompanied with fire, aſhes, or ſtones, but with loud and frequent claps of thunder, diſplaying all the different phenomena with which thunder is at different times attended. And what was very remarkable, the chaſm was formed on the ſouth ſide, between the top and the bottom of the mountain. On the ſame day another chaſm was formed two miles lower, from which iſſued a great deal of ſmoke, accompanied with a dreadful noiſe and earthquake. Towards the evening of the ſame day, four other chaſms were opened towards the ſouth, in the ſame direction, accompanied during their formation with the ſame phenomena, and extending all the way to the hill called *la Fuſara*.

About 12 paces beyond that, another of the ſame kind was formed. On the ſucceeding night, a black ſmoke, involving a quantity of ſtones, iſſued from this laſt chaſm; it diſcharged at the ſame time flakes of a dark earth-coloured ſpongy matter, which became hard after they fell. There iſſued from the ſame gulph a ſtream of lava, which held its courſe into a lake called *la Hardia*, ſix miles from Montpellieri, and on its way thither deſtroyed many dwelling-houſes and other buildings in the neighbouring villages.

On the the next day, March 12th, this ſtream of fire directed its courſe towards the tract of country called *Malpaſſo*, which was inhabited by 800 people; in the ſpace of 20 hours it was entirely depopulated and laid waſte. The lava then took a new direction, in which it deſtroyed ſome other villages.

The mount of Montpellieri was next deſtroyed with all the inhabitants upon it.

On the 23d of the ſame month the ſtream of fire was in ſome places two miles broad. It now attacked the large village of Mazzalucia; and on the ſame day a vaſt gulph was formed, from which were diſcharged ſand or aſhes, which produced a hill with two ſummits, two miles in circumference and 150 paces high. It was obſerved to conſiſt of yellow, white, black, grey, red, and green, ſtones.

The new mount of Nicoloſi continued to emit aſhes for the ſpace of three months; and the quantity diſcharged was ſo great as to cover all the adjoining tract of country for the ſpace of 15 miles; ſome of thoſe aſhes were conveyed by the winds as far as Meſſina and Calabria; and a north wind ariſing, covered all the ſouthern country about Agoſta, Lentini, and even beyond that, in the ſame manner.

While at that height on Nicoloſi ſo many extraordinary appearances were paſſing, the higheſt crater on the ſummit of Etna ſtill preſerved its uſual tranquillity.

On the 25th of March, about one in the morning the whole mountain, even to the moſt elevated peak, was agitated by a moſt violent earthquake. The higheſt crater of Etna, which was one of the loftieſt parts of the mountain, then ſunk into the volcanic focus; and in the place which it had occupied, there now appeared nothing but a wide gulph more than a mile in extent, from which there iſſued enormous maſſes of ſmoke, aſhes, and ſtones. At that period, according to the hiſtorian of this event, the famous block of lava on mount Frumento was diſcharged from the volcanic focus.

In a ſhort time after, the torrent of fire, which ſtill continued to flow, directed its courſe towards Catania with redoubled noiſe, and accompanied with a much greater quantity of aſhes and burning ſtones than before. For ſeveral months many moſt alarming ſhocks of earthquake were felt; and the city was threatened with deſtruction by the torrent of fire. They in vain attempted to turn or divert its courſe; the lava roſe over the walls, and entered by an angle near the Benedictine convent on the 11th of June following. This awful event is related by Francis Monaco, Charles Mancius, Vincent Auria, and Thomas Thedeſchi.

27. Some years after this conflagration, a new burning gulph opened in the month of December 1682 on the ſummit of the mountain, and ſpread its lava over the hill of Mezarra.

28. On the 24th of May 1686, about ten in the evening, a new eruption burſt out from the ſummit of the mountain, on the ſide contiguous to the hill del Bue. Such a quantity of inflamed matter was thrown out as conſumed woods, vineyards, and crops of grain for four leagues round. It ſtopped its courſe in a large valley near the caſtle of Maſcali. Several people from the neighbourhood had aſcended a hill between the wood of Cania and the confines of Cirrita to obſerve the progreſs of the lava; but the hill, on a ſudden, ſunk inwards, and they were buried alive.

29. Etna was now long quiet; for no leſs a ſpace of time indeed than one half of the preſent age. In the year 1755 its eruptions were renewed. It opened near mount Lepra, and emitted as uſual fire and ſmoke; after which it remained quiet only for eight years.

30. In the year 1763, there was an eruption which continued three months, but with intervals. Etna was at firſt heard to rebellow. Flames and clouds of ſmoke were ſeen to iſſue out, ſometimes ſilver-coloured, and at other times, when the rays of the ſun fell upon them, of a purple radiance: at length they were carried off by the winds, and rained, as they were driven before them, a ſhower of fire all the way to Catania and beyond it. An eruption ſoon burſt out; the principal torrent divided into two branches, one of which ran towards the eaſt, and fell into a deep and extenſive valley.

The flames which iſſued from this new crater afforded a noble ſpectacle. A pyramid of fire was ſeen to riſe to a prodigious height in the air, like a beautiful artificial fire-work, with a conſtant and formidable battery, which ſhook the earth under thoſe who were ſpectators of the ſcene. Torrents of melted matter running down the ſides of the mountain, diffuſed a light bright as day through the darkneſs of the night.

At ſun-riſing the burning lava was obſerved to have run round ſome oaks that were ſtill ſtanding unburnt. Their leaves were all withered. Some birds had fallen from their branches, and been burnt to death. Some people caſt wood upon the lava, and it was immediately burnt. This lava continued hot, and exhaled ſmoke for two years. For five years after this, no ſnow appeared on the ſummit of Etna.

31. In the year 1764 a new crater was opened at a great diſtance from the ſummit of mount Etna.

32. In the year 1766 another was opened at the grotto of Paterno; fire, ſmoke, and an inconſiderable torrent of lava iſſued out of it.

33. On the 27th of January 1780 a new opening was formed two miles under the laſt mentioned crater.

On the 28th of February, and the 14th of March, the earthquake was renewed on the north ſide, and accompanied with terrible noiſes.

Between the 6th of April and the 7th of May the convulſions were again renewed, accompanied with noiſe as before; a quantity of pumice-ſtones and fine ſand was diſcharged from it.

On the 18th of May the ſhocks were renewed: on the 23d a new crater was formed on the ſide of mount Frumento on the ſummit of Etna; and from it a torrent of lava diſcharged, which ſpread through the valley of Laudunza. It was 200 paces in breadth. Two other chinks were opened in the mountain near Paterno, and very near one another. The lava iſſuing from them proceeded in the ſpace of ſeven days ſix miles; on the 25th it had run nine miles.

A new crater was likewiſe opened on the 25th; from which a quantity of red-hot ſtones continued to iſſue for half an hour, and fell at a very great diſtance: there proceeded likewiſe from it a ſtream of lava; which, in the ſame ſpace of time, ran over a tract of country two miles in extent.

Several parts of thoſe ſtreams of lava were obſerved to be cool on the ſurface, and formed into ſolid maſſes, but melted again by a new ſtream of burning lava, which however did not melt the old lava.

34. The laſt eruption of Etna happened in 1787, as deſcribed in the former article ÆTNA, p. 222, 223.

ETOLIA, a country of ancient Greece, comprehending all that tract now called the *Deſpotat*, or *Little Greece*. It was parted on the eaſt by the river Evenus, now the Fidari, from the Locrenſes Ozolæ; on the weſt, from Acarnania by the Achelous; on the north, it bordered on the country of the Dorians and part of Epirus; and, on the ſouth, extended to the bay of Corinth.

The Etolians were a reſtleſs and turbulent people; ſeldom at peace among themſelves, and ever at war with their neighbours; utter ſtrangers to all ſenſe of friendſhip or principle of honour; ready to betray their friends upon the leaſt proſpect of reaping any advantage from their treachery: in ſhort, they were looked upon by the other ſtates of Greece no otherwiſe than as outlaws and public robbers. On the other hand, they were bold and enterpriſing in war; inured to labour and hardſhips; and undaunted in the greateſt dangers: jealous defenders of their liberties, for which they were on all occaſions, willing to venture their lives, and ſacrifice all that was moſt dear to them. They diſtinguiſhed themſelves above all the other nations of Greece, in oppoſing the ambitious deſigns of the Macedonian princes; who, after having reduced moſt of the other ſtates, were forced to grant them a peace upon very honourable terms. The conſtitution of the Etolian republic was copied from that of the Achæans, and with a view to form, as it were, a counter alliance; for the Etolians bore an irreconcileable hatred to the Achæans, and had conceived no ſmall jealouſy at the growing power of that ſtate. The Cleomenic war, and that of the allies, called the *ſocial war*, were kindled by the Etolians in the heart of Peloponneſus, with no other view but to humble their antagoniſts the Achæans. In the latter, they held out, with the aſſiſtance only of the Eleans and Lacedemonians, for the ſpace of three years, againſt the united forces of Achaia and Macedon; but were obliged at laſt to purchaſe a peace, by yielding up to Philip all Acarnania. As they parted with this province much againſt their will, they watched all opportunities of wreſting it out of the Macedonian's hands; for which reaſon they entered into an alliance with Rome againſt him, and proved of great ſervice to the Romans in their war with him: but growing inſolent upon account of their ſervices they made war upon the Romans themſelves. By that warlike nation they were overcome, and granted a peace on the following ſevere terms: 1. The majeſty of the Roman people ſhall be revered in all Etolia. 2. Etolia ſhall not ſuffer the armies of ſuch as are at war with Rome to paſs through her territories, and the enemies of Rome ſhall be likewiſe the enemies of Etolia. 3. She ſhall in the ſpace of 100 days, put into the hands of the magiſtrates of Corcyra all the priſoners and deſerters ſhe has, whether of the Romans or their allies, except ſuch as have been taken twice, or during her alliance with Rome. 4. The Etolians ſhall pay down in ready money, to the Roman general in Etolia, 200 Euboic talents, of the ſame value as the Athenian talents, and engage to pay 50 talents more within the ſix years following. 5. They ſhall put into the hands of the conſul 40 ſuch hoſtages as he ſhall chooſe; none of whom ſhall be under 12, or above 40 years of age: the pretor, the general of the horſe, and of ſuch as have been already hoſtages at Rome, are excepted out of this number. 6. Etolia ſhall renounce all pretenſions to the cities and territories which the Romans have conquered, though thoſe cities and territories had formerly belonged to the Etolians. 7. The city of Oenis, and its diſtrict, ſhall be ſubject to the Acarnanians.

After the conqueſt of Macedon by Paulus Æmilius, they were reduced to a much worſe condition; for not only thoſe among them, who had openly declared for Perſeus, but ſuch as were only ſuſpected to have favoured him in their hearts, were ſent to Rome in order to clear themſelves before the ſenate. There they were detained, and never afterwards ſuffered to return into their native country. Five hundred and fifty of the chief men of the nation were barbarouſly aſſaſſinated by the partiſans of Rome, for no other crime but that of being ſuſpected to wiſh well to Perſeus. The Etolians appeared before Paulus Æmilius in mourning habits, and made loud complaints of ſuch inhuman treatment; but could obtain no redreſs: nay, ten commiſſioners, who had been ſent by the ſenate to ſettle the affairs of Greece, enacted a decree, declaring, that thoſe who were killed had ſuffered juſtly, ſince it appeared to them that they had favoured the Macedonian party. From this time thoſe only were raiſed to the chief honours and employments in the Etolian republic who were known to prefer the intereſt of Rome to that of their country; and as theſe alone were countenanced at Rome, all the magiſtrates of Etolia were the creatures and mere tools of the Roman ſenate. In this ſtate of ſervile ſubjection they continued till the deſtruction of Corinth, and the diſſolution of the Achæan league; when Etolia, with the other free ſtates of Greece was reduced to a Roman province, commonly called the *province of Achaia*. Nevertheleſs, each ſtate and city was governed by its own laws under the ſuperintendency of the pretor whom Rome ſent annually into Achaia. The whole nation paid a certain tribute, and the rich were forbidden to poſſeſs lands any where but in their own country.

In this ſtate, with little alteration, Etolia continued under the emperors, till the reign of Conſtantine the Great, who, in his new partition of the provinces of the empire, divided the weſtern parts of Greece from the reſt, calling them *New Epirus*, and ſubjecting the whole country to the *præfectus prætorii* for Illyricum. Under the ſucceſſors of Conſtantine, Greece was parcelled out into ſeveral principalities, eſpecially after the taking of Conſtantinople by the Weſtern princes. At that time, Theodorus Angelus, a noble Grecian, of the Imperial family, ſeized on Etolia and Epirus. The former he left to Michael his ſon; who maintained it againſt Michael Palæologus, the firſt emperor of the Greeks, after the expulſion of the Latins. Charles, the laſt prince of this family, dying in 1430 without lawful iſſue, bequeathed Etolia to his brother's ſon, named alſo *Charles*; and Acarnania to his natural ſons, Memnon, Turnus, and Hercules. But, great diſputes ariſing about this diviſion, Amurath II. after the reduction of Theſſalonica, laid hold of ſo favourable an opportunity, and drove them all out in 1432. The Mahometans were afterwards diſpoſſeſſed of this country by the famous prince of Epirus, George Caſtriot, commonly called *Scanderbeg*; who with a ſmall army, oppoſed the whole power of the Ottoman empire, and defeated thoſe barbarians in 22 pitched battles. That hero, at his death, left great part of Etolia to the Venetians; but, they not being able to make head againſt ſuch a mighty power, the whole country was ſoon reduced by Mohammed II. whoſe ſucceſſors hold it to this day.

ETRURIA. See HETRURIA.

ETYMOLOGY, that part of grammar which conſiders and explains the origin and derivation of words, in order to arrive at their firſt and primary ſignification, whence Quintilian calls it *originatio*.—The word is formed of the Greek ετυμος *verus*, "true," and λεγω *dico*, "I ſpeak; whence λογια *diſcourſe*, &c. and thence Cicero calls the etymology *notatio* and *veriloquium*; though Quintilian chooſes rather to call it *originatio*.

A judicious inquiry into etymologies is thought by ſome of conſiderable uſe; becauſe nations, who value themſelves upon their antiquity, have always looked on the antiquity of their language as one of the beſt titles they could plead; and the etymologiſt, by ſeeking the true and original reaſon of the notions and ideas fixed to each word and expreſſion, may often furniſh an argument of antiquity, from the traces remaining thereof, compared with the ancient uſes. Add, that etymologies are neceſſary for the thorough underſtanding of a language. For, to explain a term preciſely, there ſeems a neceſſity for recurring to its firſt impoſition, in order to ſpeak juſtly and ſatisfactorily thereof. The force and extent of a word is generally better conceived when a perſon knows its origin and etymology.

It is objected, however, that the art is arbitrary, and built altogether on conjectures and appearances; and the etymologiſts are charged with deriving their words from where they pleaſe. And indeed it is no eaſy matter to go back into the ancient Britiſh and Gauliſh ages, and to follow, as it were, by the track, the various imperceptible alterations a language has undergone from age to age; and as thoſe alterations have ſometimes been merely owing to caprice, it is eaſy to to take a mere imagination or conjecture for a regular analogy: ſo that it is no wonder the public ſhould be prejudiced againſt a ſcience which ſeems to ſtand on ſo precarious a footing. It muſt certainly be owned, that etymologies are frequently ſo far fetched, that one can ſcarce ſee any reſemblance or correſpondence therein. Quintilian has ſhown, that the ancient etymologiſts, notwithſtanding all their learning, fell into very ridiculous derivations.

The etymologies of our Engliſh words have been derived from the Saxon, Welch, Walloon, Daniſh, Latin, Greek, &c.

In the preſent work the etymologies of words are generally noted, where their obviouſneſs does not render it unneceſſary, or their dubiety or unimportance uſeleſs.

EVACUANTS, in pharmacy, are properly ſuch medicines as diminiſh the animal fluids, by throwing out ſome morbid or redundant humour; or ſuch as thin, attenuate, and promote the motion and circulation thereof.

EVACUATION, in medicine, the art of diminiſhing, emptying, or attenuating the humours of the body.

EVAGRIUS SCHOLASTICUS, a famous hiſtorian, born at Epiphania, about the year 536. He practiſed the profeſſion of an advocate, from which he was called *Scholaſticus*, which name was then given to the pleaders at the bar. He was alſo tribune and keeper of the prefect's diſpatches. He wrote an eccleſiaſtical hiſtory, which begins where Socrates and Theodoret ended theirs; and other works, for which he was rewarded by the emperors Tiberius and Mauricius. M. de Valois publiſhed at Paris a good edition of Evagrius's eccleſiaſtical hiſtory, in folio; and it was republiſhed at Cambridge in 1620, in folio, by William Reading, with additional notes of various authors.

EVANDER, a famous Arcadian chief, called the ſon of Mercury, on account of his eloquence, brought a colony of his people into Italy, about 60 years before the taking of Troy; when Faunus, who then reigned over the Aborigines, gave him a large extent of country, in which he ſettled with his friends. He is ſaid to have taught the Latins the uſe of letters, and the art of huſbandry. He kindly received Hercules when he returned from the conqueſt of Geryon, and he was the firſt who raiſed him altars. He gave Æneas aſſiſtance againſt the Rutuli, and diſtinguiſhed himſelf by his hoſpitality. It is ſaid that he firſt brought the Greek alphabet into Italy, and introduced there the worſhip of the Greek deities. He was honoured as a God after death, and his ſubjects raiſed him an altar on mount Aventine.

AVANGELISTS, the inſpired authors of the goſpels. The word is derived from the Greek ευαγγελιον, formed of ευ *bene*, "well," and αγγελος "angle or meſſenger."

The denomination *evangeliſts* was likewiſe given in the ancient church to ſuch as preached the goſpel up and down, without being attached to any particular church, being either commiſſioned by the apoſtles to inſtruct the nations, or of their own accord abandoning every worldly attachment and conſecrating themſelves to the ſacred office of preaching the goſpel. In which ſenſe ſome interpreters think it is that St Philip, who was one of the ſeven deacons, is called the *evangeliſt*, in the 21ſt chapter of the Acts of the Apoſtles, ver. 8. Again, St Paul writing to Timothy, Ep. ii. cap. iv. ver. 5. bids him do the work of an evangeliſt. The ſame apoſtle, Eph. iv. 11. ranks the evangeliſts after the apoſtles and prophets.

EVANID, a name by ſome authors to ſuch colours as are of no long duration, as thoſe in the rainbow, in clouds before and after ſun-ſet, &c.

Evanid colours are alſo called *fantaſtical* and *emphatical* colours.

EVANTES, in antiquity, the prieſteſſes of Bacchus, thus called, becauſe in celebrating the orgia they ran about as if diſtracted, crying *Evan, evan, ohé evan.* See BACCHANALIA.

EVAPORATION, in natural philoſophy, ſignifies the converſion of fluids, principally water, into vapour, ſo that it becomes ſpecifically lighter than the atmoſphere.

The theory of evaporation, and formation of vapour by the abſorption of heat, is fully diſcuſſed under the article CHEMISTRY; it remains only therefore to take notice of ſome of the moſt remarkable phenomena attending it. With regard to water, it is generally allowed that it evaporates in every degree of heat above 32° to 212°, which is its boiling point, when it is diſſipated in great quantity, and as faſt as poſſible. It has alſo been ſuppoſed to evaporate even after its converſion into ice; but ſome late authors have denied this to be the caſe. Other liquids, ſuch as ſpirit of wine or ether, continue to evaporate long after they have been cooled down to the freezing point of water; nor is there any experiment by which it has yet been diſcovered at what degree their evaporation ceaſes. Even quickſilver, to appearance a much more heavy and ſluggiſh fluid, and which does not boil without applying almoſt three times the heat neceſſary to make water boil, is found readily to evaporate when the preſſure of the atmoſphere is taken off; and hence the empty parts of barometrical tubes, where the inſtruments were made with great accuracy and the tubes perfectly exhauſted, have been covered with mercurial globules, owing to an inviſible vapour aſcending from the ſurface of the metal. In like manner the evaporation of water is very ſenſible in ſome experiments with the air-pump. Dr Prieſtely found, that where moiſture was carefully excluded from his apparatus, he was never able to produce ſuch a quantity of inflammable air by heating charcoal as when a little quantity of water was admitted by moiſtening the leather on which the receiver ſtood. Nor is the elaſticity of this kind of ſteam altogether imperceptible; for in the barometer abovementioned, the accuracy of the inſtrument was conſiderably affected by the ſteam of the mercury aſcending from it, and occupying the void ſpace in the upper part of the glaſs tube.

1 Evaporation promoted by electricity.

Evaporation, according to the experiments of the Abbé Nollet, appears to be promoted by electricity. The concluſions drawn from them are, 1. Electricity auguments the natural evaporation of fluids; all that were tried, excepting mercury and oil, being found to ſuffer a conſiderable diminution, greater than what could be aſcribed to any other cauſe. 2. Electricity augments the evaporation of thoſe fluids the moſt which are found moſt readily to evaporate ſpontaneouſly; the volatile ſpirit of ſal-ammoniac ſuffering a greater loſs than ſpirit of wine or oil of turpentine, theſe two more than common water, and water more than vinegar or a ſolution of nitre. 3. The effects ſeemed always to be greateſt when the veſſels containing the fluids were non-electrics. 4. The increaſed evapotion was more conſiderable when the veſſel which contained the liquor was more open; but the effects did not increaſe in proportion to the apertures. 5. Electricity was alſo found to increaſe the evaporation from ſolid bodies, and of conſequence to augment the inſenſible perſpiration of animals.

Evaporation is one of the great natural proceſſes, and by means of it the whole vegetable kingdom is ſupplied with rain neceſſary for its ſupport. This evaporation takes place at all times, not only from the ſurface of the ocean, but of the earth alſo. Dr Halley, by an experiment with a pan of water kept in the heat of our ſummer ſun, found, that as much water might be reaſonably ſuppoſed to evaporate from the ſurface of the Mediterranean ſea, as would be ſufficient to ſupply all the rivers which run into it. Dr Watſon in his Chemical eſſays, has ſhown, that the evaporation is not leſs conſiderable from the ſurface of the land than from that of the ſea. By inverting a glaſs veſſel on the ground, in the time of a conſiderable drought, he found that even then about 1600 gallons of water were raiſed from an acre in 24 hours; and repeating the experiment after a thunder-ſhower, he found that in ſuch a ſtate an acre parted with above 1900 gallons of water in 12 hours.

2 Great quantity of water evaporated naturally from the earth and ſea.

This evaporation is carried on not only from the ground itſelf, but from the leaves of trees, graſs, &c. with which it is covered; and great part of the water thus raiſed falls down again in the night-time in dew, being abſorbed by the ſame vegetables which yielded it before. Thus the earth is not ſo ſoon exhauſted of water, even for a little way below the ſurface as we might be apt to imagine from the quantity raiſed by evaporation: for if all that was raiſed by the ſun's heat during the time of a long drough, left the earth not to return to it for perhaps five or ſix weeks, the whole vegetable kingdom, at leaſt ſuch as do not ſtrike their roots very deeply into the ground, muſt of neceſſity be deſtroyed; which yet we ſee is only the caſe with the moſt tender graſs, and even that only on the moſt elevated ſituations, and when moſt expoſed to the ſun.

3 Cold produced by evaporation.

Another great uſe of the natural evaporation is to cool the earth, and to prevent its being too much heated by the ſun. This property of producing cold by evaporation has been but lately obſerved by chemiſts, though it has long been employed by thoſe who knew not the reaſon of their doing ſo. It has been obſerved at Aleppo in Syria, that the water in their jars is always the cooleſt when the weather is moſt warm and the power of the ſun exceſſive. The heats in that part of the world are ſometimes almoſt intolerable; and at that time the evaporation from the outſide of the jars, which are made of porous clay, is very copious; and in proportion to the quantity of water evaporated from without, is the degree of cold in the liquor within. The reaſon of this is eaſily deduced from what is ſaid under the article CHEMISTRY: where it is ſhown that vapour is compoſed of fire and water united together. The conſequence of this is, that wherever there is any quantity of latent heat above 32° of Fahrenheit contained in any body, the water in contact with the ſurface, or contained in the pores of the body, will gradually abſorb it, and converting it into latent heat, will thus be rendered ſpecifically lighter than the common atmoſphere, and fly off into it. Thus part of the ſenſible heat of the body will be carried off; and as ſubſequent quantities of water always fly off with more and more of the ſenſible heat, it is plain, that by continued evaporation of water almoſt all the ſenſible heat above 32° of Fahrenheit will be carried off. If inſtead of water, ſpirit of wine be made uſe of, which continues to evaporate long after it is cooled to 32°, a much greater degree of cold may be produced than by the evaporation of mere water; and if inſtead of ſpirit of wine, we make uſe of ether, which is ſtill more volatile than ſpirit of wine, an exceſſive degree of cold, ſcarcely inferior to that which congeals mercury, may be produced.

This method of producing cold by means of the expenſive liquids of ether and ſpirit of wine, cannot be employed excepting merely for the ſake of experiment: but that by the evaporation of water may be applied to very uſeful purpoſes in the warm countries; and it has been cuſtomary with ſailors to cool their caſks of liquors by ſprinkling them with ſea water.

4 Effects of evaporation on the human body.

From the theory of evaporation laid down under the article CHEMISTRY, we may eaſily ſee the reaſon why, in a very warm temperature, animal bodies have the power of producing cold. A vapour, called inſenſible perſpiration, continually iſſues from the bodies of animals, from human bodies eſpecially, which, carrying off great quantities of their ſenſible heat, enables them, according to its quantity, to preſerve the ſame temperature in many different degrees of atmoſpherical heat.

For the ſame reaſon alſo we may ſee why the continual ſprinkling with cold water is ſo very powerful in depriving the human body of the heat neceſſary for the ſupport of life, even though the temperature of the water ſhould not be below what can be eaſily borne. It has already been ſhown, that by the evaporation of water, a degree of cold not much inferior to that of freezing water may be produced; and conſequently, by continual ſprinkling of the body with water, the whole might in time be reduced to nearly the degree of cold in which water freezes. But this is what no human body can bear: and hence we may underſtand why ſtorms of rain and ſnow are often fatal; and likewiſe why, in caſes of ſhipwreck, people have died by being expoſed for a few hours to the ſpray of the ſea.

5 Curious phenomenon with regard to melting ice.

The theory of the evaporation of water laid down under the article CHEMISTRY, furniſhes us alſo with a ſolution of a very curious phenomenon, inexplicable on any other principle, viz. why melting ice will freeze other pieces together more ſtrongly; and, if a conſiderable degree of heat is not continued for ſome time, will again conſolidate itſelf into a much harder maſs than before. The fact was diſcovered by Mr Wedgewood in an attempt to connect his clay thermometer with the common mercurial ones. In this attempt he had occaſion to repeat an experiment made by Meſſrs Lavoiſier and de la Place, who had meaſured the heat of bodies by the quantity of ice they are capable of liquefying. Theſe authors obſerve, that if ice cooled to any degree below the freezing point, be expoſed to a warmer atmoſphere, it will be brought up to the freezing point through its whole maſs before any part of it begins to liquefy; and that conſequently ice, beginning to melt on the ſurface, will be always exactly at the ſame temperature, viz. at the freezing point; and that if a heated body be incloſed in a hollow ſphere of ſuch ice, the whole of its heat will be occupied in melting it: ſo that if the ice be defended from external warmth, by ſurrounding it with other ice in a proper veſſel, the weight of the water produced from it will be exactly proportional to the heat which the heated body has loſt; or, in other words, will be a true phyſical meaſure of the heat. For the experiment, they provide a tin veſſel divided by upright concentric partitions into three compartments, one within another. The innermoſt compartment is a wire-cage for receiving the heated body; the ſecond, ſurrounding this cage, is filled with pounded ice, to be melted by the heat; and the outermoſt is filled alſo with pounded ice, to defend the former from the warmth of the atmoſphere. The firſt of theſe ice compartments terminates at bottom in a ſtem like a funnel, through which the water is conveyed off; and the other ice compartment terminates in a ſeparate canal for diſcharging the water into that ice which is reduced. As ſoon as the heated body is dropped into the cage, a cover is put on, which goes over both that and the firſt ice compartment; which cover is itſelf a kind of ſhallow veſſel filled with pounded ice, with holes in the bottom for permitting the water to paſs from this ice into the ſecond compartment; all the liquefaction that happens in both being only the effect of the heated body. Another cover, with pounded ice, is placed over the whole as a defence from external warmth.

Mr Wedgewood began by ſatisfying himſelf that ice did really acquire the temperature of 32° throughout its whole ſubſtance before it began to melt; but being apprehenſive that the pounded ice might imbibe and retain ſome water among it by capillary attraction, he judged it neceſſary to attend to this circumſtance alſo. Having therefore pounded ſome ice, he laid it in a conical heap on a plate; and having at hand ſome water coloured with cochineal, he poured it gently into the plate at ſome diſtance from the heap. It roſe haſtily to the top, and was retained by the maſs as by

a

Evaporation.

a ſponge; nor did any part of it begin to drop till the heat of his hand began to liquefy the maſs. He farther obſerved, that in a conical heap of this kind the water roſe two inches and a half in the ſpace of three minutes; and by weighing the water employed, and what remained upon the plate unabſorbed, it appeared that four ounces of ice had taken up and retained one ounce of water. To aſcertain this abſorbing power of ice more fully, he preſſed ſix ounces of it into a funnel, having firſt introduced a wooden core, in order to leave a proper cavity in the middle; then taking out the core, and pouring an ounce of water on the ice, he left the whole for half an hour, during which time there ran out only 12 pennyweights and four grains; ſo that the ice had retained ſeven pennyweights and 20 grains; nearly one-twelfth of its own weight and two-fifths of the weight of the water.

Being now convinced that it would be proper to uſe ſolid ice inſtead of that which was pounded, he determined to congeal a quantity of water into one maſs by a freezing mixture, and then expoſe it to the atmoſphere till it began to liquefy. His apparatus for this purpoſe is repreſented Plate CLXXXIX. *A* is a large funnel filled with a ſolid maſs of ice. *B*, a cavity in the middle of this ice, formed part of the way by ſcraping with a knife, and for the remaining part by boring with a hot iron wire. *C*, one of the thermometer pieces ſerves for the heated body, and reſts on a coil of braſs wire: it had been previouſly burnt with a ſtrong fire, that there might be no danger of its ſuffering any farther diminution of bulk by being heated again for thoſe experiments. *D*, a cork ſtopped in the orifice of the funnel. *E*, the exterior veſſel, having the ſpace between the ſides and its included funnel *A* filled with pounded ice as a defence to the ice in the funnel. *F*, a cover for this exterior veſſel, filled with pounded ice for the ſame purpoſe. *G*, a cover for the funnel, filled alſo with pounded ice, with perforations in the bottom for allowing the water to paſs from this ice down to the funnel. The thermometer piece was heated in boiling water, taken up with a ſmall pair of tongs equally heated, dropped inſtantly into the cavity *B*, and the covers put on as expeditiouſly as poſſible; the bottom of the funnel being previouſly corked, that the water might be detained till it ſhould part with all its heat, and likewiſe to prevent the water from the other ice, which ran down on the outſide of the funnel, from mingling with it. After ſtanding about 10 minutes the funnel was taken out, wiped dry, and uncorked over a weighed cup. The water that ran out weighed 22 grains. On repeating the experiment the water weighed only 12 grains; and on a third trial, in which the piece was continued much longer in the cavity, the liquid did not amount to three drops. To his ſurpriſe Mr Wedgewood alſo now found the piece frozen to the ice ſo that it could not eaſily be got off, though all the ice was at the beginning of the experiment in a thawing ſtate.

On heating the piece again to 6° of his thermometer (1857 of Farenheit), and throwing ſome fragments of ice over it, he found that in about half an hour the water amounted to 11 pennyweights. On ſtopping the funnel, replacing the covers, and leaving the whole about ſeven hours, he found, that a conſiderable quantity of water was collected; but it ran out ſo ſlowly, that he imagined ſomething had ſtopped the narrow end of the funnel: but on examining the ſtate of the ice, he foud that the fragments he had thrown over the thermometer-piece were entirely frozen together, and in ſuch a form that it was evident they could not have aſſumed it without freſh water having been ſuperadded and thrown upon them, the cavities between them being partly filled with new ice. This was ſo ſtrongly cemented, that he could ſcarcely get it out with the point of a knife, and great part of the coiled wire was found enveloped in the new ice. The paſſage through the ice to the ſtem of the funnel, which had been made pretty wide with a thick iron wire, was ſo nearly ſhut up, that the ſlow draining of the water was now very eaſily accounted for; this draining of the water indeed being the only ſign of any paſſage at all. On taking the ice out of the funnel, and breaking it to examine this canal, he found it almoſt entirely filled up with ice projecting from the ſolid maſs in cryſtalline forms, ſimilar in appearance to the cryſtals we often meet with in the cavities of flints and quartzoſe ſtones. A coating of ice was alſo found on the outſide of the funnel perfectly tranſparent, and of a conſiderable extent, about the $\frac{1}{10}$th of an inch thick: this coating enveloped alſo a part of the funnel which was not in contact with the ſurrounding ice, the latter being melted to the diſtance of an inch from it. Some of the ice being ſcraped off from the inſide of the funnel and applied to the bulk of the thermometer, the mercury ſunk from 50° to 32°, and continued at that point till the ice was melted; after which the water being poured off, it roſe in a little time to 47°.

Aſtoniſhed at theſe appearances, our author determined to repeat the experiment with ſome pieces of ice he had ſtored in a cellar; but on going thither, he found the caſk of ice itſelf in a ſimilar ſituation to that made uſe of in his experiments. Though much of it was melted, yet the fragments were frozen together, ſo that it was with difficulty that any pieces could be broken or got out with an iron ſpade; and when ſo broken, it had the appearance of Breccia marble, or plumpudding ſtone; the fragments having been broken and rammed into the caſk with an iron mall. A porcelain cup being laid upon ſome of this ice about half an hour, in a room whoſe temperature was 50°, it was found pretty firmly adhering; and when pulled off, the ice exhibited an exact impreſſion of the fluted part of the cup with which it had been in contact; ſo that the ice muſt neceſſarily have been liquefied firſt, and afterwards congealed. This was ſeveral times repeated with the ſame event. Fragments of the ice were likewiſe applied to one another, to ſponges, pieces of flannel, and linen cloth, both moiſt and dry: all thoſe in a few ſeconds began to cohere; and in about a minute were frozen ſo as to require ſome force to ſeparate them. After ſtanding an hour, the coheſion was ſo firm, that on pulling away the fragments of ice from the woollen and ſponge, they tore off with them that part of the ſurface with which they were in contact; though at the ſame time both the ſponge and flannel were filled with water which that very ice had produced.

The power of the congelation was ſtronger on the ſponge and woollen than on linen; and to eſtimate its force, a piece of ice was applied to a bit of dry flannel weighing two pennyweights and an half, ſurrounding them at the ſame time with other ice. After lying together three quarters of an hour, he found that a weight of five ounces was neceſſary to ſeparate them, though ſo much of the ice had liquefied that the weight of the flannel was increaſed by more than 12 pennyweights. The piece of ice was then weighed, put to the flannel a ſecond time, and left in contact with it for four hours; at the end of which time they were found ſo firmly frozen together, that 78 ounces were required for their ſeparation, although from 42 pennyweights of the ice 15 more had melted off: the ſurface of contact was at this time about a ſquare inch. Continuing them in contact for 7 hours longer, they only bore 62 ounces, the ice being diminiſhed to 14 pennyweights, and the ſurface of contact reduced to about $\frac{6}{10}$ths of an inch ſquare.

6
Water abſorbed by ſolid ice.

On trying whether maſſes of ice apparently ſolid would abſorb water, he found that they did ſo in conſiderable quantity; for on heating ſome of his thermometer pieces, and laying them on pieces of ice, in which they made conſiderable cavities, he always found the water abſorbed as faſt as it was produced, leaving both the piece and the cavity dry.

7
Two different theories of this phenomenon.

Thus was our author convinced, that, in his experiments, the two ſeemingly oppoſite proceſſes of nature, congelation and liquefaction, went on together at the ſame time, in the ſame veſſel, and even in the ſame piece of ice. To account for ſuch an extraordinary phenomenon, he had recourſe to two different theories. One was, that water, when highly attenuated, and reſolved into vapour, may freeze with a leſs degree of cold than water in its aggregate or groſſer form: whence hoar froſt is obſerved on graſs, trees, &c. at times when there is no appearance of ice upon water, and when the thermometer is above the freezing point; which ſeems alſo to have been the opinion of Boerhaave, as he places the freezing of vapour, or even of water when divided by abſorption in a linen cloth, at 33°. “ Now (ſays Mr Wedgewood), as the atmoſphere abounds with watery vapour, or water diſſolved and chemically combined, and muſt be particularly loaded with it in the neighbourhood of melting ice; as the heated body introduced into the funnel muſt neceſſarily convert a portion of the ice or water into vapour; and as ice is known to melt as ſoon as the heat begins to exceed 32°, or nearly one degree lower than the freezing point of vapour; I think we may from hence deduce pretty ſatisfactorily all the phenomena I have obſerved. For it naturally follows from theſe principles, that vapour may freeze where ice is melting; that the vapour may congeal, even upon the ſurface of melting ice itſelf; and that the heat which, according to the ingenious theory of Dr Black, it emits in freezing, may contribute to the further liquefaction of that very ice upon which the new congelation is formed.

“ I would further obſerve, that the freezing of water is attended with plentiful evaporation in a cloſe as well as in an open veſſel; the vapour in the former condenſing into drops on the under ſide of the cover, which either continue in the form of water, or aſſume that of ice or a kind of ſnow, according to circumſtances; which evaporation may perhaps be attributed to the heat, that was combined with the water, at this moment rapidly making its eſcape, and carrying part of the aqueous fluid off with it. We are hence furniſhed with a freſh and continual ſource of vapour as well as heat: ſo that the proceſſes of liquefaction and congelation may go on uninterruptedly together, and even neceſſarily accompany one another; although, as the freezing muſt be in an under proportion to the melting, the whole of the ice muſt ultimately be conſumed.

“ Some other circumſtances may be taken notice of in the coating of ice on the outſide of the throat of the funnel. Neither the cover of the outer veſſel, nor the aperture in its bottom which the ſtem of the funnel paſſed through, were air-tight; and the melting of the ſurrounding ice had left a vacancy about an inch round that part of the funnel on which the cruſt had formed. As there was therefore a paſſage for air through the veſſel, a circulation of it would probably take place; the cold and denſe air in the veſſel would deſcend into the rarer air of the room, then about 50°, and be replaced by air from above. The effect of this circulation and ſudden refrigeration of the air will be a condenſation of part of the moiſture it contains upon the bodies it is in contact with; the throat of the funnel being one of theſe bodies, muſt receive its ſhare; and the degree of cold in which the ice thaws being ſuppoſed ſufficient for the freezing of this moiſt vapour, the contact, condenſation, and freezing, may happen at the ſame inſtant. The ſame principles apply to every inſtance of condenſation that took place in theſe experiments; and the congelation was evidently ſtrongeſt in thoſe circumſtances where vapour was moſt abundant, and on thoſe bodies which from their natural or mechanic ſtructure were capacious of the greateſt quantity of it; ſtronger, for inſtance, on ſponge than on woollen, ſtronger on this than on the cloſer texture of linen, and far ſtronger on all of theſe than on the compact ſurface of porcelain.”

The ſecond theory propoſed by our author for ſolving the phenomena in queſtion is founded entirely on the principles of evaporation. “ If neverthleſs (ſays he) the principle I have aſſumed, that water highly attenuated will congeal with a leſs degree of cold than water in the maſs, ſhould not be admitted; another has above been hinted at, which experiments have decidedly eſtabliſhed, from which the phenomena may perhaps be equally accounted for, and which, even though the other alſo is received, muſt be ſuppoſed to concur for ſome part of the effect: I mean that evaporation produces cold; both vapour and ſteam carrying off ſome proportion of heat from the body which produces them. If therefore evaporation be made to take place upon the ſurface of ice, the contiguous ice will thereby be rendered colder; and as it is already at the freezing point, the ſmalleſt increaſe of cold will be ſufficient for freſh congelation. If ice is producible by evaporation in the Eaſt Indies*, where natural ice is never ſeen, we need not wonder that congelation ſhould take place where the ſame principle operates amidſt actual ice.

“ It has been obſerved above, that the heat emitted by the congealing vapour probably unites with and liquefies contiguous portions of ice: but whether the whole, either of the heat ſo emitted, or of that originally introduced into the funnel, is thus taken up; how often it may unite with other portions of ice, and be driven out from other new congelations; whether there exiſts any difference in its chemical affinity or elective attraction to water in different ſtates and the

* See *Congelation.*

contiguous bodies; whether part of it may not ultimately eſcape, without performing the office expected from it upon the ice; and to what diſtance from the evaporating ſurface the refrigerating power may extend, muſt be left for further experiments to determine."

EVASION, in law, is uſed for any ſubtile endeavour to ſet aſide truth, or to eſcape the puniſhment of the law, which will not be endured. This, if a perſon ſays to another that he will not ſtrike him, but will give him a pot of ale to ſtrike him firſt, and accordingly he ſtrikes, the returning of it is puniſhable; and if the perſon firſt ſtriking be killed, it is murder; for no man ſhall evade the juſtice of the law by ſuch a pretence to cover his malice.

EVATES, a branch or diviſion of the druids, or ancient Celtic philoſophers. Strabo divides the Britiſh ancient Gauliſh philoſophers ino three ſects; bards, evates, and druids. He adds, that the bards were the poets and muſicians; the evates, the prieſts and naturaliſts: and the druids were moraliſts as well as naturaliſts: But Marcellus and Hornius reduce them all to two ſects, *viz.* the BARDS and DRUIDS.

EUBAGES, an order of prieſts or philoſophers among the ancient Celtæ or Gauls: ſome will have the eubages to be the ſame with the druids and ſaronidæ of Diodorus; and others, that they were the ſame with what Strabo calls EVATES.

EUBOEA (anc. geog.), an oblong iſland, ſtretching out between Attica and Theſſaly, oppoſite to Bœotia; from which it is ſeparated by a narrow ſtrait called *Euripus*. This iſland, never exceeding 40, nor ever falling ſhort of two miles in breadth, is in length 150 miles, and in compaſs 365, according to Pliny. Now NEGROPONT, from its principal town, which was anciently called *Chalcis*.

EUCHARIST, the ſacrament of the Lord's ſupper, properly ſignifies *giving thanks*. The word in its original Greek Ευχαριστια, literally imports *thankſgiving*; being formed of ευ, *bene*, "well," and χαριν,, *gratia*, "thanks."

This ſacrament was inſtituted by Chriſt himſelf, and the participation of it is called *communion*.

As to the manner of celebrating the euchariſt among the ancient Chriſtians, after the cuſtomary oblations were made, the deacon brought water to the biſhops and preſbyters, ſtanding round the table, to waſh their hands; according to that of the pſalmiſt, "I will waſh my hands in innocency, and ſo will I compaſs thy altar, O Lord." Then the deacon cried out aloud, "Mutually embrace and kiſs each other;" which being done, the whole congregation prayed for the univerſal peace and welfare of the church, for the tranquillity and repoſe of the world, for the proſperity of the age, for wholeſome weather, and for all ranks and degrees of men. After this followed mutual ſalutations of the miniſter and people; and then the biſhop or preſbyter having ſanctified the elements by a ſolemn benediction, he brake the bread, and delivered it to the deacon, who diſtributed it to the communicants, and after that the cup. Their ſacramental wine was uſually diluted or mixed with water. During the time of adminiſtration, they ſang hymns and pſalms; and having concluded with prayer and thankſgiving, the people ſaluted each other with a kiſs of peace, and ſo the aſſembly broke up.

EUCHITES, or EUCHITÆ, a ſect of ancient heretics, who were firſt formed into a religious body towards the end of the fourth century, though their doctrine and diſcipline ſubſiſted in Syria, Egypt, and other eaſtern countries before the birth of Chriſt; they were thus called becauſe they prayed without ceaſing, imagining that prayer alone was ſufficient to ſave them. Their great foundation were thoſe words of St Paul, (Theſſalonians v. 17.), *Pray without ceaſing*. The word is formed of the Greek, ευχη *prayer*, whence ευχιται, the ſame with the Latin, *precatores*, "prayers." They were alſo called *Enthuſiaſts* and *Meſſalians*; a term of Hebrew origin, denoting the ſame as Euchites.

The Euchites were a ſort of myſtics who imagined, according to the oriental notion, that two ſouls reſided in man, the one good and the other evil; and who were zealous in expelling the evil ſoul or dæmon, and haſtening the return of the good ſpirit of God, by contemplation, prayer, and ſinging of hymns. They alſo embraced the opinions nearly reſembling the Manichean doctrine, and which they derived from the tenets of the oriental philoſophy. The ſame denomination was uſed in the 12th century, to denote certain fanatics who infeſted the Greek and Eaſtern churches, and who were charged with believing a double Trinity, rejecting wedlock, abſtaining from fleſh, treating with contempt the ſacraments of baptiſm and the Lord's ſupper, and the various branches of external worſhip, and placing the eſſence of religion ſolely in external prayer, and maintaining the efficacy of perpetual ſupplications to the ſupreme Being for expelling an evil being or genius, which dwelt in the breaſt of every mortal. This ſect is ſaid to have been founded by a perſon called *Lucopetrus*, whoſe chief diſciple was named *Tychicus*. By degrees it became a general and invidious appellation for perſons of eminent piety and zeal for genuine Chriſtianity, who oppoſed the vicious practices and inſolent tyranny of the prieſthood; much in the ſame manner as the Latins comprehended all the adverſaries of the Roman pontiff under the general terms of WALDENSES and ALBIGENSES.

St Cyril of Alexandria, in one of his letters, takes occaſion to cenſure ſeveral monks in Egypt, who, under pretence of reſigning themſelves wholly to prayer, led a lazy, ſcandalous life. A cenſure likewiſe applicable to monaſteries in general.

EUCHOLOGIUM, Ευχολογιον, a Greek term, ſignifying literally *a diſcourſe on prayer*. The word is formed of ευχη *prayer*, and λογος *diſcourſe*.

The Euchologium is properly the Greek ritual, wherein are preſcribed the order and manner of every thing relating to the order and adminiſtration of their ceremonies, ſacraments, ordinations, &c.

F. Goar has given us an edition of the Greek Euchologium in Greek and Latin, with notes, at Paris.

EUCLID *of* MEGARA, a celebrated philoſopher and logician, flouriſhed about 400 B. C. The Athenians having prohibited the Megarians from entering their city on pain of death; this philoſopher diſguiſed himſelf in womens clothes to attend the lectures of Socrates. After the death of Socrates, Plato and other philoſophers went to Euclid at Megara, to ſhelter themſelves from the tyrants who governed Athens. Euclid admitted but one chief good; which he ſometimes called *God*, ſometimes *Spirit*, and ſometimes *Providence*.

EUCLID *of Alexandria*, the celebrated matematician, flouriſhed in the reign of Ptolemy Lagus, about 277. B. C. He reduced all the fundamental principles of pure mathematics, which had been delivered down by Thales, Pythagoras, Eudoxus, and other mathematicians, before him, into regularity and order, and added many others of his own diſcovering; on which account he is ſaid to be the firſt who reduced arithmetic and geometry into the form of a ſcience. He likewiſe applied himſelf to the ſtudy of mixed mathematics, and eſpecially to aſtronomy, in which he alſo excelled. The moſt celebrated of his works is his Elements of Geometry, of which there have been a great number of editions in all languages; and a fine edition of all his works was printed in 1703, by David Gregory, Savilian profeſſor of aſtronomy at Oxford.

EUCRASY, (of ευ *well*, and κρασις *temperature*), in medicine, an agreeable well proportioned mixture of qualities, whereby a body is ſaid to be in good order and diſpoſed for a good ſtate of health.

EUDIOMETER, an inſtrument for obſerving the purity of the atmoſpherical air, or the quantity of pure dephlogiſticated or vital air contained in it, chiefly by means of its diminution on a mixture with nitrous air*. Several kinds of theſe have been invented, the principal of which are the following.

* See *Aerology*, no 60, 154.

1
Dr Prieſtley's eudiometer.

I. The eudiometer originally uſed by Dr Prieſtley is a divided glaſs tube, into which, after having filled it with common water, and inverted it into the ſame, one or more meaſures of common air, and an equal quantity of the nitrous kind, are introduced by means of a ſmall phial, which is called the *meaſure*; and thus the diminution of the volume of the mixture, which is ſeen at once by means of the graduations of the tube, inſtantly diſcovers the purity of the air required.

2
Landriani's eudiometer.

II. The diſcovery of this property of nitrous air and the eudiometer by Dr Prieſtley, ſoon produced various attempts to improve on the principle, and conſtruct more elegant and accurate machines for diſcovering the ſmalleſt inequality in the conſtitution of the atmoſphere. The firſt of theſe was contrived by Mr Landriani; an account of which is publiſhed in the ſixth volume of M. Roſier's Journal for the year 1775. It conſiſts of a glaſs tube, fitted by grinding to a cylindrical veſſel, to which are joined two glaſs cocks and a ſmall baſon; the whole being fitted to a wooden frame. Quickſilver is uſed in this inſtrument inſtead of water; but the uſe of that fluid occaſions an inconvenience, becauſe the nitrous air acts upon the metal, and renders the experiment ambiguous.

3
Inconvenience attending its uſe.

4
Magellan's firſt eudiometer.

III. In 1777 Mr Magellan publiſhed an account of three eudiometers invented by himſelf. The firſt of theſe, repreſented Plate CLXXXVI. fig. 1. conſiſts of a glaſs tube *MD*, about 12 or 15 inches long, and quite cylindrical throughout, having the upper orifice cloſed with a ground-glaſs ſtopple *M*. A veſſel *C* is joined to the lower part of the tube, and likewiſe well adapted by grinding. This veſſel has three necks, as repreſented in the figure: one of which ſerves to join it to the tube *M*; the other two are ground to thoſe of the phials *A* and *B*, whoſe capacities muſt be as equal as poſſible, as well to each other as to the tube *MD*. *Z* repreſents a braſs ring which ſlides up and down the tube *MD*, and by a finger-ſcrew may be tightened or ſlackened at pleaſure, and ſet to any place upon it. *G* is a braſs or wooden ruler divided into equal parts, with two ſemicircular braſs pieces, by which it may eaſily be applied and kept near the glaſs tube *MD*, as is ſhown at *F*; where it muſt be kept cloſe to the neck, or upper extremity of the tube, by the notch *I*. In uſing this inſtrument, we muſt firſt remove the ſtopple *M*, after which the inſtrument is to be entirely filled with water by dipping it in the tub. The ſtopple is then to be replaced; taking care that no bubble of air may remain either in the tube, the veſſel *C*, or the two phials *A B*. The lower part of the inſtrument, viz. about as far as the middle of the tube, muſt then be kept under water, and one of the phials *A* or *B*, now filled with water, is to be removed from the neck of the veſſel *C*, and filled with the air of which we deſign to try the purity, in the manner directed under the article Gas; after which it is to be replaced into the neck of the veſſel *C*; and in like manner the other phial muſt be filled with nitrous air, and replaced in the other neck. Taking the inſtrument then out of the water, the veſſel *C* muſt be turned with the bottom upwards, as repreſented at *F*; in which caſe, the two elaſtic fluids contained in the phials will aſcend into the veſſel *C*; where, mixing together, the diminution will be affected. But as ſoon as the veſſel is turned round the inſtrument muſt be plunged in water as far as about the middle of the tube, and the ſtopple *M* removed. As the bulk of the two elaſtic fluids diminiſhes, the water in the tube *MD* deſcends. This inſtrument is ſubject to ſome errors, ariſing from the greater or leſſer height of the column of water in the tube *MD*, as it is held more or leſs perpendicular; it may alſo vary by the very act of putting in the ſtopple *M*. Another and ſtill grater fault is, that it cannot admit but one meaſure of nitrous to one of common air, which is a very uncertain method of eſtimating the purity of a given kind of reſpirable air. The diviſions on the ſcale are likewiſe too large, and it does not ſeem capable of any great accuracy.

5
Inaccuracy of this inſtrument.

6
His ſecond eudiometer.

The ſecond kind of eudiometer conſtructed by M. Magellan is repreſented fig. 2. and conſiſts of a glaſs tube *TC*, two or three feet long, and having a cavity as nearly cylindrical as poſſible. One of the ends, *C* is bent forwards as repreſented in the figure, the other at *T* is open, and may terminate in a funnel, to obviate the neceſſity of uſing a ſeparate one. The whole tube is faſtened by means of two loops to the braſs ſcale *CWN*. *N* is a glaſs phial, having its neck *V* ground air-tight to the inſide of the end of the tube *T*; the whole phial containing one-half of what the tube *TC* is capable of containing; but the phial *ABC*, at the other end, muſt contain three or four times the quantity that *N* can contain; and the neck of it muſt alſo be ground air-tight to the end *C* of the tube. The ſcale *CWTV* is divided into 128 parts, the diviſions being ſet from *T* towards *C*; and the cavity of the tube between the firſt and laſt of them being double the capacity of the phial *N*. *XR* is a tin veſſel, which may ſerve as a caſe for packing the whole inſtrument and its appendages; as alſo for a trough for holding water when experiments are to be made. The glaſs tube *g h*, and the glaſs ſtopple *M*, are both ground air-tight to the mouth *V* of the tube, in order to be put into it occaſionally. To uſe this kind of eudiometer, let the inſtrument be immerſed under water in the tin-

EUDIOMETER.

Plate CLXXXVI.

Fig. 1.

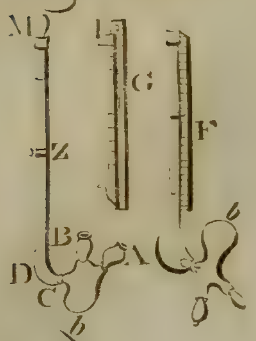


Fig. 2.

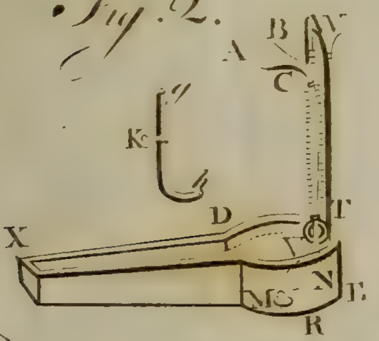


Fig. 3.

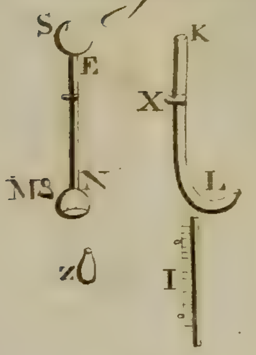


Fig. 4.

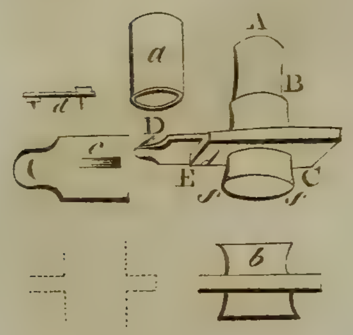


Fig. 6.

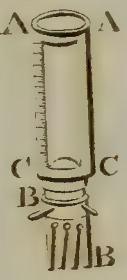


Fig. 9.

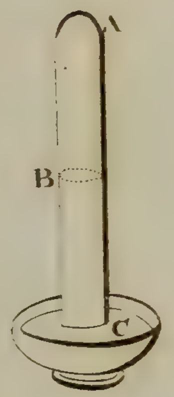


Fig. 8.

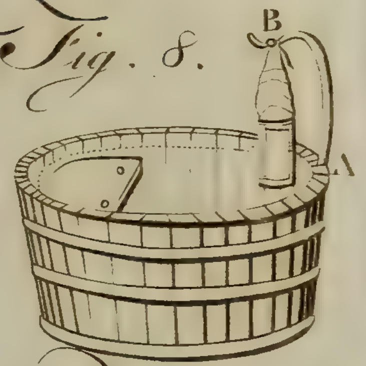


Fig. 11.

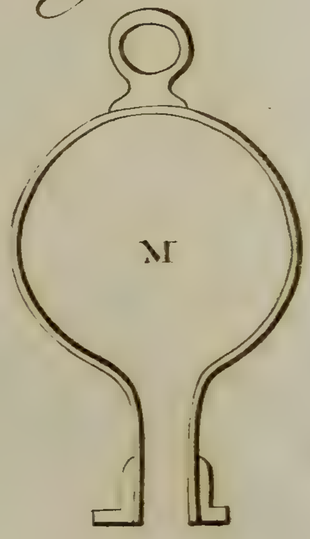


Fig. 5.

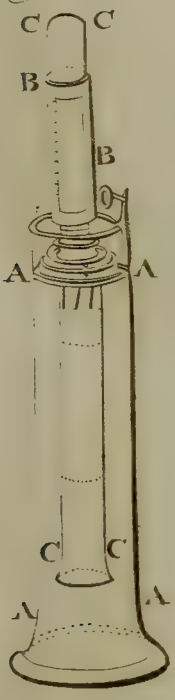


Fig. 7.

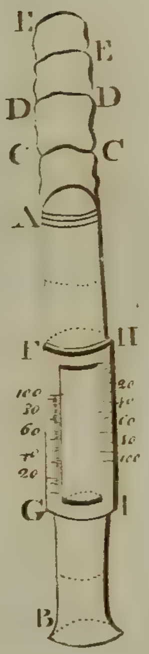


Fig. 10.

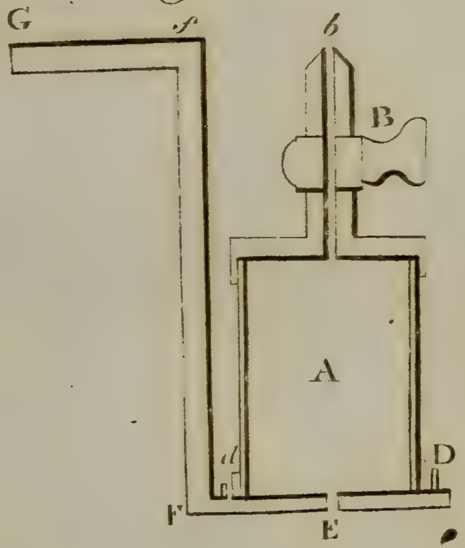


Fig. 13.

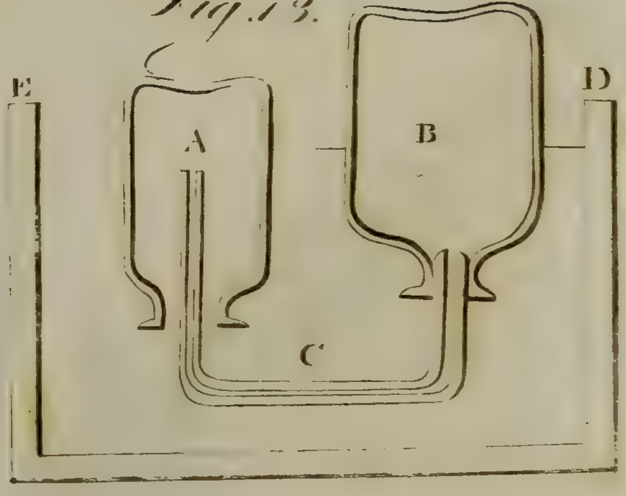
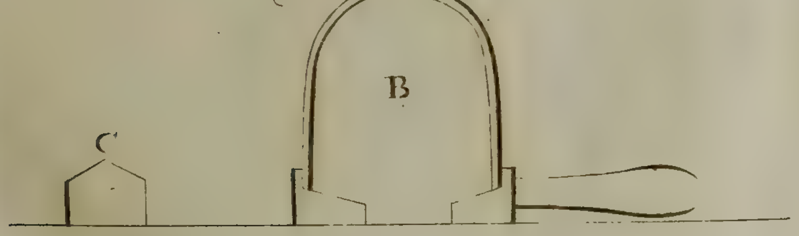


Fig. 12.



veſſel; then let the phial N, when filled with water, be put into CED, the inſide ſocket of the tin-veſſel. Fill it then with nitrous air; and let this quantity be thrown into the phial ABC, which is to be fixed ſomewhat tight to the mouth C of the eudiometer. The ſame phial N is afterwards filled with the air of which we wiſh to try the quality; and raiſing the end of the inſtrument C, it is then put into the mouth V. The inſtrument is then to be placed upright as in the figure, by hanging it on the hook W; and as ſoon as this laſt air goes up to the phial ABC, the phial N is to be taken off, that the diminution of the two mixed airs may be ſupplied from the water in the tin-veſſel: the mouth V of the eudiometer being all this time held under water. The bent tube gh having the braſs ring K fitted to it, is then put to the lower end V of the eudiometer. By obſerving the ſurface of the water in the ſmall tube, which thus forms a true ſyphon with the tube of the inſtrument, and by means of the braſs ring K, the ſtationary ſtate of diminution in the mixture may be diſtinguiſhed; which being aſcertained, the ſmall tube gh is taken off from the eudiometer, and the whole inſtrument laid down for ſome minutes in the water of the tin-veſſel; after which the mouth V is to be ſhut up with the glaſs-ſtopple M; and, reverſing the inſtrument, it is hanged up by the end V upon the hook W. By this poſition the whole diminiſhed air of the veſſel ABC goes up to the top, where its real bulk is ſhown by the ſcale facing the inſide ſurface of the water. This number being deducted from 128, gives the comparative wholeſomeneſs of the air already tried without any farther calculation. But this proceſs (ſays Mr Magellan) will be ſtill eaſier, when the laſt diminution of the two kinds of air is only required in the obſervation: becauſe no uſe will then be made of the ſyphon. In ſuch a caſe the inſtrument is left hanging on the hook W for 48 hours; after which it is laid down under the water of the trough in an horizontal poſition for 8 or 12 minutes, in order to acquire the ſame temperature with the water: the mouth V is then ſhut up with the ſtopple M; the inſtrument is hung by the end V in a contrary poſition; and the laſt real bulk of the good mixed air will then be ſhown by the number of the braſs ſcales anſwering to the inſide ſurface of the water.

7 His third eudiometer.

IV. The third eudiometer conſtructed by Mr Magellan is repreſented fig. 3. where EN repreſents an uniformly cylindrical glaſs tube about two or three feet long, with a large ball S and a glaſs ſtopple M, fitted air-tight to the mouth N, which ought to be wide and funnel-ſhaped, unleſs a ſeparate funnel is made uſe of. KL is a ſmall ſyphon with a braſs ring X; Z a ſmall phial, the contents of which do not exceed one third of the ball S, or one-half of the glaſs-tube. Laſtly, the inſtrument has a ruler I, divided and ſtamped like the ſcale already mentioned, with a glaſs funnel, which is ground to the mouth N of the inſtrument, when this is not funnel-ſhaped as above directed. When this eudiometer is to be made uſe of, it muſt be filled with water, and ſet in a vertical poſition, with the mouth N under the ſurface of the water in a tub or trough. The phial Z is to be filled with nitrous air, and thrown into the tube by means of a glaſs-funnel, if the mouth of the eudiometer tube be not ſufficiently wide to anſwer the purpoſe. The ſame phial Z is then to be filled with the air to be tried; after which the ſyphon KL is to be immediately added to the mouth N of the eudiometer under the ſurface of the water, ſome of which is to be poured into it. The ſtationary moment of the greateſt diminution of the two airs is watched by means of the ring X; and, when that moment arrives, the ſyphon KL is to be taken off; the eudiometer is laid for ſome minutes under water in an horizontal poſition or nearly ſo; but taking care that none of the incloſed air may eſcape: the mouth N is then ſhut up with the glaſs-ſtopple M, and the inſtrument is inverted with the mouth N upwards. Laſtly, the ſpace occupied by the reſiduum of the diminiſhed air is meaſured by applying to its ſide the divided ruler or ſcale, and the reſult is eſtimated as has been already explained.

8 Inconveniences of all theſe inſtruments.

On all theſe eudiometers it is very obvious to remark, that they are complicated and difficult to be uſed; and it is beſides no eaſy matter to get them made with the requiſite accuracy. Mr Cavallo obſerves alſo, that the conſtruction of all the three is founded on a ſuppoſition that the mixture of nitrous and atmoſpherical air, after having continued for ſome time to diminiſh, increaſes again; but he informs us that this is a miſtake, and that Mr Magellan himſelf owned it to be ſo. But the worſt of all is, that they are by no means accurate, as appeared from ſeveral experiments made by Mr Magellan in Mr Cavallo's preſence, with air taken out of the window of the room where the experiments were performed. By the firſt trial, the diminution was 48 parts out of 132 of the mixture: on a ſecond trial, the ſame elaſtic fluids being ſtill uſed, the diminution was 58 parts out of 132: on a third trial, the diminution was again 48; and by a fourth one, it was 51. Nay, Mr Magellan himſelf owned that, after many experiments with his eudiometers, he never could obtain any conſtant reſult, even when the nitrous and common air which he made uſe of were preciſely of the ſame quality.

9 Fontana's eudiometer.

V. A preferable method of diſcovering the purity of the air by means of an eudiometer is recommended by M. Fontana; of which Mr Cavallo ſays, that its accuracy is ſuch as could ſcarce be believed by thoſe who have not had an opportunity of obſerving it. The inſtrument is originally nothing more than a divided glaſs tube, though the inventor afterwards added to it a complicated apparatus, which, in Cavallo's opinion, was altogether uſeleſs. The firſt ſimple eudiometer conſiſted ſimply of a glaſs tube, as uniformly cylindrical as poſſible in its cavity, about 18 inches long, and $\frac{3}{4}$ths of an inch in diameter in the inſide, hermetically ſealed at one end (A). The outſide of this tube was marked with a diamond, or had circles drawn round it at the diſtance of three inches from one another, beginning at the cloſe end of the tube; or at ſuch diſtances

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(A) To obſerve whether the cavity of a glaſs tube is perfectly cylindrical, pour into it at different times equal quantities of mercury or water, one upon the other; obſerving each time, by means of a divided ruler, if thoſe equal quantities of liquor fill equal lengths of the tube.

ſtances as are exactly filled by equal meaſures of elaſtic fluids. When the parts of theſe diviſions were required, the edge of a ruler, divided into inches and ſmaller parts, was held againſt the tube; ſo that the firſt diviſion of the ruler might coincide with one of the marks on the tube. The nitrous and atmoſpherical air are introduced into this tube, in order to be diminiſhed, and the purity of the atmoſpheric air thus aſcertained; but that an equal quantity of elaſtic fluid may always be certainly introduced, M. Fontana contrived the following inſtrument as a meaſure, which cannot be liable to any error. It is repreſented figure 4. and conſiſts of a glaſs tube *AB*, about two inches long and one in diameter, cloſed at the end *A*, and having a braſs piece *BCDE* cemented on the other, containing a ſliding door *D*: which when puſhed into its proper cavity, ſhuts the mouth of the tube or meaſure *AB*; and when pulled out, as repreſented in the figure, opens it. To prevent it from being pulled out entirely, a ſpring *E* is ſcrewed upon the flat part of the braſs piece, the extremity of which bears upon the head of a braſs pin, which paſſing through a hole, rubs againſt the door *D*; and when this is pulled nearly out, the pin, falling into a ſmall cavity, prevents it from coming quite out. The diameter of the braſs piece is nearly the ſame with that of the glaſs tube *AB*: and near its mouth *C* there are two notches made with a file.

10
His inſtrument for meaſuring a quantity of air exactly.

Under the ſame figure the cavity of the braſs piece and the parts of the meaſure are ſhown ſeparately, *viz.* *a*, the glaſs tube; *b*, the braſs piece; *c*, the ſliding braſs door inverted in ſuch a manner as to exhibit the cavity for the pin; *d*, the pin with the ſpring and ſmall ſcrew. The inſide ſurface of this meaſure, as well as of the long tube, ſhould have the poliſh taken off by rubbing with emery; as this prevents the water, when the experiments are made, from adhering to it in drops, and thus the meaſurements will be more exact.

11
Method of uſing this eudiometer.

To uſe this apparatus, the long tube muſt be filled with water; and being inverted in the tub of water deſcribed under the article Gas, furniſhed with a ſhelf, the meaſure, being alſo filled with water, is inverted over an hole in the ſhelf; and in order to fill it with the elaſtic fluid required, a phial containing it is brought under the hole; where being inclined a little, part of the gas eſcapes and paſſes into the meaſure. The water then eſcapes through the notches *ss*, made with the file in the mouth of the meaſure, as already mentioned (b). The door of the meaſure is then ſhut by puſhing it in as far as it will go; and the meaſure, being drawn off from the ſhelf, but ſtill kept under water, is turned with the mouth upwards; by which means the ſuperfluous quantity of elaſtic fluid, remaining in the cavity of the braſs piece by reaſon of its being ſeparated by the ſliding piece, eſcapes, and has its place occupied by water. The meaſure being then again inverted with its mouth downwards, is ſet any where on the ſhelf of the tub; the long tube put over the hole of the ſhelf, and the air transferred from the meaſure to this tube, as has already been directed for filling the meaſure itſelf.

When M. Fontana made uſe of this eudiometer, he commonly threw in two meaſures of reſpirable air into the tube; then he added one meaſure of nitrous air: but as ſoon as the latter was entered, he removed the tube from the ſhelf, holding it by the upper end, and agitating it for about 20 ſeconds in the water. The tube was then reſted upon the ſide of the tub, while the meaſure was again filled with nitrous air; then putting the tube upon the ſhelf, and holding it as nearly perpendicular as he could, he applied the divided edge of the ruler to it, in order to obſerve the diminution of the two fluids. After this he threw in a fourth meaſure of nitrous air; and after ſhaking and letting it reſt for ſome time, he obſerved again the diminution of the two elaſtic acids.

12
Why this eudiometer is ſo accurate.

"That this method (ſays Mr Cavallo) ſhould be very accurate, may perhaps appear ſomewhat myſterious; but the myſtery will ſoon vaniſh, if it be conſidered that the accurate reſult depended not ſo much on the particular conſtruction of the inſtrument, as on the regular management of it and uniformity of the operation. The exactneſs of the meaſure indeed contributed a great deal; but M. Fontana obſerved, that with exactly the ſame quantities of nitrous and common air, very different reſults could be occaſioned by their being left a longer or ſhorter time before the inſtrument was agitated, or by being agitated much or little, as well as ſeveral other circumſtances, which to a ſuperficial obſerver would appear to be of little conſequence. He therefore performed the operation always in a ſimilar manner, viz. by agitating the tube always for the ſame length of time, and always with equal quickneſs; by which means, when the ſame elaſtic fluids were uſed, the reſults of the experiments were ſo nearly the ſame, that the difference, if any could be obſerved, might be neglected without any impropriety."

13
Is ſtill liable to ſome ſmall errors.

Notwithſtanding the accuracy of this inſtrument, however, M. Fontana found that it was ſtill liable to ſome ſmall errors ariſing from the following ſources. 1. The elaſtic fluid within the tube, when the greateſt part of it is filled with water, and the tube is kept out of the water excepting its mouth, is not of the ſame denſity with the outward or atmoſpheric air, on account of the pillar of water in the tube; which, according as it is longer or ſhorter, counterbalances more or leſs the preſſure of the atmoſphere upon the quantity of elaſtic fluid contained in the upper part of the tube; which quantity of elaſtic fluid of conſequence occupies a greater or leſſer ſpace in the tube, according to the greater or leſs preſſure it endures. This error, however, becomes inſenſible when the column of water is very ſhort, and the ſurface of the water on the outſide coincides nearly with that on the inſide of the tube. 2. The difficulty of keeping the inſtrument perpendicular in the act of meaſuring the diminution. And, 3. The ſtill greater difficulty of obſerving with what diviſion of the ruler the ſurface of the water within the tube coincided.

14
Fontana's method of avoiding theſe errors.

To avoid theſe errors, M. Fontana made uſe of the following contrivance. *AAAA*, fig. 5. repreſents a ſtrong glaſs tube about 3 inches diameter, and 18 inches long, with a foot of glaſs all made of one piece. Within about an inch of the mouth of this tube a braſs ring is faſtened, which contains two braſs rings moveable upon oppoſite centres, in the ſame manner that ſea-compaſſes are uſually ſuſpended, and which are commonly called *gingles*. *CCCC* repreſents the meaſuring tube or eudiometer; which is exactly the ſame with that already deſcribed, having lines marked upon its outſide ſurface to ſhow the ſpaces occupied by equal meaſures of elaſtic fluid. The ſcale *BB* is adapted to this tube, which is ſhewn ſeparately in fig. 6. It conſiſts of two braſs ſlips *AC*, *AC*, connected by two braſs rings, *AA*, *CC*, through which the eudiometer tube paſſes. To the loweſt of theſe rings a perforated braſs piece BB, furniſhed with croſs pins or pivots, is ſcrewed; and by means of longitudinal cuts, its lower extremity is rendered ſpringy; ſo that when all the piece *AB*, *AB* is put upon the eudiometer tube, the latter cannot ſlip from within the former, unleſs the operator forces it. When the eudiometer tube, with the ſcale, &c. is put together, as repreſented fig. 5. the croſs pins of the piece *BB*, fig. 6. reſt upon the inner ring of the gingle at *AA*, fig. 5. by which means the tube *CCCC*, is kept perpendicular within the tube *AAAA*, provided this latter be ſituated ſo nearly perpendicular that the former may not touch the ſide of it, which would prevent it from acquiring the poſition deſired. One of the braſs ſlips *AC*, fig. 6. is divided into equal parts; 100 of which are equivalent to the ſpace between two of the marks on the eudiometer tube *CCCC*, fig. 5. and conſequently ſhow the parts of a meaſure. Theſe diviſions are numbered from the upper edge of the lower ring connecting the two braſs ſlips, *AC*, *AC*.

(b) The meaſure would be filled with elaſtic fluid though theſe notches were not made, but not ſo readily, becauſe the water could not eaſily get out.

When this inſtrument is to be uſed, one or more meaſures of reſpirable air are thrown into the eudiometer tube; a meaſure of nitrous air is then added; and after ſhaking the tube for ſome time, it muſt be introduced into the large tube *AAAA*, which for this purpoſe muſt be plunged into the water of the tub; for the mouth of the eudiometer tube muſt not at preſent be taken out of the water. After it has been introduced into the large tube, the whole is taken out of the water, and ſet upon the ſhelf or a table. Now the large tube *AAAA* is filled with water, and the eudiometer tube ſuſpended perpendicularly in it by means of the croſs pins or pivots of the braſs piece annexed to the ſcale, which reſts upon the inner ring of the gingle. The operator muſt then ſlide the tube *CCCC* up and down through the ſcale and braſs piece, &c. till the ſurface of the water within the tube coincides exactly with the upper edge of the lower ring that connects the two braſs ſlips of the ſcale piece, which may be done very accurately by means of a magnifying glaſs. The ſurface of the water within the eudiometer is concave; and when viewed horizontally, it appears like a dark line or limit exceedingly well defined; ſo that the middle or lowermoſt point of it may be made to coincide with the edge of the braſs ring with great preciſion, except when ſome drops of water hang on the outſide of the tube, which ſhould therefore be wiped off.

Having aſcertained this point, we muſt next obſerve which diviſion of the ſcale coincides with one of the circular diviſions marked upon the glaſs tube *CCCC*, which will ſhow the parts of a meaſure. Thus ſuppoſe, that when the eudiometer tube is fixed, ſo that the ſurface of the water in it coincides perfectly with the edge of the lower braſs ring, viz. with the beginning of the diviſions; that the 70th diviſion of the ſcale falls upon the firſt circular mark, as repreſented in the figure; then it is plain, that the quantity of elaſtic fluid contained in the tube is equal to one meaſure and 70 hundreth parts more. This being obſerved, and the large tube again immerſed in the water, the eudiometer-tube is removed from it, but always taking care that its mouth be not lifted up above the ſurface of the water. Another meaſure of nitrous air muſt now be introduced into the eudiometer-tube; which, after being agitated as already directed, is to be put into the large tube *AAAA*. The whole is then taken out of the water, and the diminution of the elaſtic fluid obſerved as above directed.

Thus the eudiometer tube is kept quite perpendicular, and the pillar of water in it rendered very ſhort, not exceeding half an inch at moſt. It is eaſy to perceive, however, that if the operator, when furniſhed with the eudiometer-tube only, keeps it ſo far immerged in the water of the tube when he obſerves the diviſions, that the water within the tube may be nearly equal with the edge of the tub; the large tube *AAAA* may be ſpared, and the operation will thus become much more eaſy and expeditious. Little difference can happen from the poſition of the tube; becauſe the braſs ring aſcertains the poſition of the water ſo well, and the difference occaſioned by a few degrees deviation from the true perpedicular is ſo ſmall, that it can ſcarce be perceived.

15 M. Sauſſure's eudiometer.

VI. M. Saſſure of Geneva has invented an eudiometer, which he ſuppoſes to be more exact than any of thoſe hitherto deſcribed. His apparatus conſiſts of the following parts. 1. A cylindrical glaſs bottle with a ground ſtopple, capable of containing about five ounces and an half, and which ſerves as a receiver for mixing the two airs. 2. A ſmall glaſs phial, whoſe capacity is nearly equal to one third of that of the recipient, and ſerves for a meaſure. 3. A ſmall pair of ſcales which may weigh very exactly. 4. Several glaſs bottles for containing the nitrous or other air to be uſed, and which may ſupply the place of the recipient when broken. The whole of this apparatus may be eaſily packed into a box, and thus tranſported from place to place, and even to the ſummits of very high mountains. The method of uſing it is as follows.

1. The receiver is to be filled with water, cloſed exactly with its glaſs ſtopper, wiped on the outſide, and weighed very exactly. Being then immerged in a veſſel full of water, and held with the mouth downwards, the ſtopple is removed, and, by means of a funnel, two meaſures of common and one of nitrous air are introduced into it one after another: theſe diminiſh as ſoon as they come into contact; in conſequence of which the water enters the recipient in proportionable quantity. After being ſtopped and well ſhaken, to promote the diminution the receiver is to be opened under water; then ſtopped and ſhaken, and ſo on for three times ſucceſſively. At laſt the bottle is ſtopped under water, taken out, wiped very clean and dry, and weighed exactly as before. It is plain, that now when the bottle is filled partly with elaſtic fluid and partly

with water, it muſt be lighter than when quite full of water; the weight of it then being ſubtracted from the former, the remainder ſhows that quantity of water which would fill the ſpace occupied by the diminiſhed elaſtic fluid. Now, in making experiments with airs of different degrees of purity, the abovementioned remainder will be greater when the diminution is leſs, or when the air is more impure, and *vice verſa*; and thus the comparative purity between two different kinds of airs may be determined.

16 Inconveniences and errors to which this machine is liable.

On this method it is obvious to remark, that notwithſtanding the encomiums beſtowed on it by the inventor, it is ſubject to many inconveniencies and errors, principally ariſing from the inaccuracy of the meaſure, and the difficulty of ſtopping the bottle without occaſioning a preſſure, upon the contained elaſtic fluid, which being variable, muſt occaſion ſome error in the weight of the bottle.

17 Mr Cavallo's eudiometer.

VII. To avoid the inconveniences to which all theſe inſtruments are ſubject, Mr Cavallo employed a glaſs tube with its ſcale and meaſure, ſuch as is repreſented fig. 5. the length of the tube being about 16 or 17 inches, and between $\frac{1}{2}$ and $\frac{1}{3}$ of an inch in diameter, and of as equal a bore as poſſible throughout, having one end ſealed hermetically, and the other ſhaped like a funnel, though not very wide. The the whole of this apparatus is repreſented fig. 7. where *AB* is the glaſs tube, to the upper end of which a loop *AEC* ſhould be faſtened, made of waxed ſilk-lace, with ſeveral croſs threads *CG, DD, EE*, &c. in order to ſuſpend the inſtrument to a hook *AB*, fig. 8. which ſhould either be faſtened to that ſide of the tube oppoſite to the ſhelf, or ſo conſtructed that it may be eaſily fixed and removed again as occaſion requires; or it may be made of thick braſs wire, the lower extremity of which fits a hole made in the ſide of the tub. The braſs piece with the ſcale, which ſlides upon the eudiometer, is formed of two braſs ſlips *FG, HI* (fig. 7.), joined by two braſs rings, to which they are ſoldered. One hundred diviſions are marked upon one of thoſe braſs ſlips, beginning from the upper edge of the lower ring *GI*, and all together equal to the ſpace contained between two of the marks or meaſures made upon the glaſs tube; ſo that they ſhow the parts of a meaſure. An hundred diviſions are likewiſe marked upon the other braſs ſlip *HI*, beginning from the lower edge of the upper ring *FH*.—The following directions are given by Mr Cavallo for marking theſe diviſions. "When the tube *AB* is filled with water, a meaſure of air ſhould be thrown into it in the manner already directed: the tube muſt then be ſuſpended to the hook by the loop, as repreſented fig. 8, ſo high, that the ſurface of the water within the tube may be very near the ſurface of the water in the tub, two inches, for inſtance, above it; then looking horizontally through the tube, a mark ſhould be made by ſticking a bit of ſoft wax upon the tube, juſt coinciding with the lower part of the ſurface of the water within it; in which place afterwards a circular mark ſhould be made with the edge of a flint, or with a piece of agate or diamond, but not ſo deep as to endanger the breaking of the tube. Thus the firſt meaſure is marked; and in like manner may any other one be marked. The attentive practitioner, however, ſhould never venture to mark the tube with an indelible ſtroke after one trial, leſt he ſhould be miſtaken. The proper method is to mark them firſt with wax, and then repeat the operation once or twice, in order to correct ſome errors that might eſcape the firſt time; after which the mark may be made with a diamond, flint, or perhaps more conveniently with a file. The poliſh of the inſide of both tube and meaſure ſhould be taken off with emery; which is a very labourious operation, though it is particularly neceſſary that the meaſure ſhould be done in this manner."

18 Method of uſing it.

To uſe this eudiometer, fill the tube with water, taking care that no bubbles of air remain in it; and inverting it with the mouth downwards, leave it in the water leaning againſt the ſide of the tub. Fill the meaſure then with the elaſtic fluid whoſe purity is to be tried. Put the eudiometer tube upon the ſhelf of the tub, keeping it perpendicular, and with the mouth exactly upon the hole of the ſhelf, and throw the meaſure of air into it; fill it again with the ſame air, and throw this likewiſe into the tube. Then fill it with nitrous air, and throw this alſo into the tube, which muſt be ſhaken immedictely after the operation by moving it alternately up and down in the water of the tub for about a quarter of a minute. It is then left a ſhort time at reſt and ſuſpended by the hook formerly mentioned, ſo that the ſurface of the water in the inſide may be about two inches above that in the tub; when the braſs ſcale is ſlided upon it till the upper edge of the lower ring coincide with the middle part of the ſurface of the water within the tube, and then we may obſerve which diviſion of the ſcale coincides with any of thoſe on the tube; by which means the quantity of elaſtic fluid remaining in the tube may be clearly ſeen, even to the hundredth-part of a meaſure. The following directions are given by our author for noting down the reſults in a clear and accurate manner.

19 Method of noting down the reſults of the experiments.

"1. The two meaſures firſt introduced into the tube are expreſſed by a Roman number; after which the ſingle meaſure of nitrous air is expreſſed by another Roman number; and the meaſures, with the parts of a meaſure, remaining in the tube after diminution, are expreſſed by common numbers with decimals. Thus, ſuppoſe, that after introducing two meaſures of common and one of nitrous air, and after ſhaking in the manner above directed, the quantity of fluid remaining in the eudiometer is ſuch, that when the upper edge of the lower ring of the ſcale coincides with the lower point of the ſurface of the water in the tube, the 56th diviſion of the ſcale falls againſt the ſecond circular diviſion on the tube, then this diminution is marked thus II. I, 2,56; ſignifying that two meaſures of common and one of nitrous air, after diminution by being mixed together, occupy the ſpace of two meaſures and 56th hundredth parts of a meaſure.—Laſtly, after marking the firſt diminution, throw a ſecond meaſure of nitrous air into the tube; ſhake the inſtrument; and after a little reſt, obſerve this ſecond diminution; which, ſuppoſing it to have reduced the whole bulk to three meaſures and ſeven hundredth-parts, is thus marked down, II, II, 3,07. Sometimes one, two, or three meaſures of nitrous air muſt ſtill be added, in order to obſerve the diminution of ſome very pure ſpecies of reſpirable air. The diviſions which begin from the upper ring of the ſcale-piece of the eudiometer are uſeful when the quantity of elaſtic fluid contained in is ſo ſmall, that the edge of the lower braſs ring cannot be raiſed ſo high as to coincide with the edge of the water within the tube on account of the ſilk loop: in which caſe the under edge of the upper ring is brought to that point; and we muſt then obſerve which of thoſe diviſions coincides with the firſt circular diviſion upon the tube. If it be aſked, Why the two or more meaſures of nitrous air are not thrown into the tube all at once, and the laſt diminution noted? the anſwer is, That in this method, the effects of ſimilar experiments have not been found equally uniform with thoſe tried in the abovementioned manner.

20 Precautions neceſſary to be obſerved in making the experiments.

2. "In this operation care ſhould be taken to ſhake the tube immediately after the nitrous air has been thrown into it, and to leave it at reſt afterwards for ſome time; otherwiſe the reſults of ſimilar experiments are far from being alike. It is alſo neceſſary to obſerve, that by holding the meaſure or the eudiometer tube with the hand, which is warmer than the water of the tub, the elaſtic fluid undergoes ſome degree of rarefaction, ſo that the event of the experiments may often be rendered precarious. For this reaſon the inſtruments ſhould be held only with the extremities of the fingers and thumb; and before the door of the meaſure be ſhut, or the point of the ſcale on the eudiometer tube be fixed, thoſe inſtruments ſhould be left a ſhort time by themſelves, keeping the hands and breath at a ſufficient diſtance from them."

21 Phenomena to be obſerved in experiments of this kind.

The following are ſome particulars neceſſary to be obſerved in making experiments of this kind.

1. When reſpirable air is mixed with nitrous air, their joint bulk is diminiſhed, and the diminution is greater when the air is purer, *cæteris paribus*, and *vice verſa*.

2. On mixing the two airs together all at once, the enſuing diminution is greater than if the ſame quantity of nitrous air be added to an equal quantity of reſpirable air at different times: and hence it follows, that the quicker the two ſorts of elaſtic fluids are mixed together, the greater is the diminution, and contrarywiſe.

3. Nitrous air of different quality occaſions a different degree of diminution with reſpirable air; and therefore care ſhould be taken to uſe ſuch materials as afford air always of the ſame quality. The moſt proper ſubſtance for this purpoſe is very pure quickſilver; a quarter of an ounce, or even leſs, with a proper quantity of diluted nitrous acid, will produce a great deal of nitrous air, which is always of the ſame quality, provided the metal be always of equal purity; but with other metals, as braſs, copper, &c. the nitrous air made at one time is often different from that made at another, and therefore occaſions a greater or leſs diminution when mixed with common air though preciſely of the ſame ſort.

4. The quality of nitrous air is impaired by keeping, eſpecially when in contact with water; and for this reaſon it ought to be prepared freſh every two or three days.

5. In performing theſe experiments, it ſhould be carefully remarked, that no miſtakes ariſe from heat or cold; as the elaſtic fluids are eaſily contracted or expanded, by any variation of temperature.

6. Though the greateſt diminution takes place immediately after mixing the reſpirable and nitrous airs together, eſpecially when they are agitated, yet they continue to diminiſh a little for ſome time after; for which reaſon the diminution ſhould be obſerved always at a certain time after the mixture is made. The whole proceſs indeed ought always to be performed in an uniform manner, otherwiſe the reſults will be frequently very diſſimilar.

7. It muſt be remarked, that the ſurface of the water which lies contiguous to the elaſtic fluid contained in a ſmall veſſel, is very far from being a plane, or even from being always of a ſimilar figure in the ſame veſſel, on account of the attraction or repulſion between the ſubſtance of the glaſs and water. This is altered by many circumſtances, particularly by the adheſion of extraneous bodies; whence it is very improper to uſe common open phials for this purpoſe. We muſt alſo take into conſideration the drops of water adhering to the ſides of the veſſel, and the quality of the water in which the operation is performed.

8. In caſe the experiment is to take up ſome hours, in order to obſerve the laſt diminution, it will be proper to notice, by a good barometer, if the gravity of the atmoſphere has ſuffered any alteration during that time; for a difference in its preſſure may occaſion ſome difference in the reſult of the experiments.

9. A ſimple apparatus is always to be preferred to a more complicated one, even though the latter ſhould appear to have ſome advantage over it in point of accuracy. Complex machines are not only expenſive, and ſubject to be eaſily put out of order, but occaſion frequent miſtakes, on account of the operator having generally many things to do and keep in proper order; whence it is eaſy to overlook ſome of them.

45 Of the ſources of error in this kind of experiments.

It has already been remarked, that one ſource of error in the experiments made with eudiometers is the inequality of the column of water in the tube by which the mixture of elaſtic fluids is confined. For example, if a cubic inch of air, taken near the apparatus where the experiment is to be performed, be introduced into a long tube previouſly filled and inverted in water, ſo that the ſurface of the water in the tube may be 20 inches higher than that in the baſon, the air in the upper part will then be found to occupy a conſiderably larger ſpace than if the column of water was ſhorter; becauſe in the former caſe the preſſure of the water in the tube partly counterbalances the preſſure of the atmoſphere, ſo that the latter is leſs able to reſiſt the elaſticity of the confined air. The difference will be much greater if quickſilver be made uſe of inſtead of water, as the weight of that fluid is much greater than that of water. To avoid this, it has been directed to manage matters ſo that the ſurface of the fluid on the outſide may nearly correſpond with that in the inſide of the tube; but this is ſometimes impracticable, eſpecially where quickſilver is uſed, with which the error is more conſiderable than with water: in ſuch caſes, therefore, we muſt have recourſe to calculation, and deduce the real quantity of elaſtic fluid from the apparent ſpace it occupies in a receiver, which is partly filled with it and partly with water or ſome other groſs fluid. For this purpoſe it muſt be remembered, that the ſpaces into which air or any other elaſtic fluid is contracted, are to one another in the inverſe ratio of the preſſures which confine theſe elaſtic fluids; hence the ſpace occupied by a quantity of elaſtic fluid AB, (fig. 9.)

confined in the tube *AC* inverted in quickſilver, and filled with it as far as *B*, is to the ſpace which the ſame quantity of fluid occupies out of the tube, as the preſſure which acts upon it when out of the tube is to the preſſure which acts upon it in the tube; that is, as the height of the barometer, to the ſame height of the barometer deducting the height *BC* of the quickſilver in the tube. Thus, ſuppoſe that the length *AB* of the tube occupied by an elaſtic fluid is three inches, and that the length *BC*, filled with quickſilver, is 20 inches; it is required to determine the length of the ſame tube, which the ſame quantity of elaſtic fluid would occupy if the ſurface of the quickſilver in the baſon was brought even with *B*. viz. if the ſaid elaſtic fluid was only acted upon by the preſſure of the atmoſphere. Firſt obſerve the height of the barometer at that time, which ſuppoſe to be 30 inches; then ſay, As the height of the barometer is to the ſame height deducting the height of the quickſilver *CB* in the inverted tube *AB*; ſo is the ſpace *AB* to the real ſpace required: that is, $30 : 30—20 :: 3 : \frac{3\times30—20}{30} = 1$: ſo that one inch is the length of the tube *AC* which the quantity of elaſtic fluid *AB* would occupy, if the ſurface *B* of the quickſilver in it was brought even with that of the quickſilver in the baſon. Here, however, we muſt ſuppoſe the tube *AC* to be perfectly cylindrical; otherwiſe the calculation would become very intricate by being adapted to the form of the veſſel.

23 Mr Cavendiſh's eudiometer.

VIII. In the 73d volume of the Philoſophical Tranſactions, we have an account of a new eudiometer by Mr Cavendiſh. He prefers the Abbe Fontana's to all the reſt: the great improvement in which (he ſays) is, that as the tube is long and narrow, and the orifice of the funnel not much leſs than the bore of the tube, and the meaſure made to deliver its contents very quick, the air riſes ſlowly up the tube in one continued column; ſo that there is time to take the tube off the funnel, and to ſhake it before the airs come quite into contact; by which means the diminution is much greater and more certain than it would otherwiſe be. Thus, if equal meaſures of nitrous and common air are mixed together in this manner, the bulk of the mixture will, in general, be about one meaſure; but if the airs are ſuffered to remain in contact about a quarter of a minute before they are ſhaken, the bulk will hardly be leſs than one meaſure and one fifth; and it will be very different according to the length of time they are ſuffered to remain before they are ſhaken. In like manner, if, through any fault in the apparatus, the air riſes in bubbles, as in that caſe it is impoſſible to ſhake the tube ſoon enough, the diminution is always leſs than it ought to be. Another very conſiderable advantage ariſing from the method of mixing the airs juſt mentioned is, that the diminution takes place in its full extent almoſt inſtantly; but if they are allowed to remain for ſome time in contact before they are ſhaken, the mixture will continue diminiſhing for many hours.

24 Why Fontana's method excels the reſt ſo much.

The reaſon of theſe differences, according to our author, is, that, in the Abbe Fontana's method, the water is ſhaken briſkly up and down in the tube while the airs are mixing; by which means every ſmall portion of nitrous air muſt be in contact with water either at the inſtant it mixes with the common air, or at leaſt immediately after; and it ſeems that the water, by abſorbing the nitrous acid the moment it is formed, greatly contributes to the quickneſs of the diminution, as well as to the quantity of it. Hence Mr Cavendiſh was induced to try whether the diminution would not be more certain and regular, if one of the airs were added to the other ſlowly and in ſmall bubbles, the veſſel being kept ſhaking all the while that the mixture was made: and on trial he found that this method fully anſwered his expectations.

25 Advantage of adding one of the airs ſlowly to the others.

26 Mr Cavendiſh's apparatus deſcribed.

The apparatus uſed by our author is, 1. a cylindrical glaſs veſſel *A* (fig. 10.), with braſs caps at top and bottom. To the upper cap a braſs cock *B* is fitted: the bottom cap is open, but made to fit cloſe into the braſs ſocket *D d*, and is fixed into it in the ſame manner as a bayonet is on a muſket. This ſocket has a ſmall hole *E* in its bottom, and is faſtened to the board of the tub by the bent braſs *F f G*, in ſuch a manner that *b*, the top of the cock may be about half an inch under water: conſequently, if the veſſel *A* is placed in its ſocket with any quantity of air in it, and the cock is then opened, the air will run out by the cock; but will do ſo very ſlowly, as it can eſcape no faſter than the water can enter by the ſmall hole *E* to ſupply its place.

2. Beſides this veſſel, there are three glaſs bottles like *M*, fig. 11. having each a flat braſs cap at bottom to make it ſtand ſteady, and a ring at top to ſuſpend it; alſo ſome glaſs meaſures of different ſizes, as *B* fig. 12. having a flat braſs cap at bottom with a wooden handle. Theſe are filled with the air to be meaſured, then ſet upon the braſs knob *C* fitted to the board of the tub below the ſurface of the water, which drives out ſome of the air leaving only the proper quantity.

27 His method of mixing the airs, &c.

In mixing the airs together, our author commonly adds the reſpirable ſlowly to the nitrous; to do which, a proper quantity of nitrous gas is put into the bottle *M*, by means of one of the meaſures already deſcribed, and another quantity of reſpirable air is put into the veſſel *A*, by firſt filling it with this air, and then putting it on the knob *C*, as was done by the meaſure; after which the veſſel *A*, is fixed in the ſocket, and the bottle *M* placed with its mouth over the cock. The quantities of air made uſe of, and the diminution of the mixture, are determined by weighing the veſſels under water in the following manner. From one end of a balance, placed in ſuch a manner as to hang over the tub of water, a forked wire is ſuſpended, to each end of which fork is fixed a fine copper wire; and in trying the experiment, the veſſel *A*, with the reſpirable air in it, is firſt weighed by ſuſpending it from one of thoſe copper wires, ſo that it may remain entirely under water. The bottle *M*, with the proper quantity of nitrous air in it, is then hung in the ſame manner on the other wire, and the weight of both together determined. The air is then let out of the veſſel *A* into the bottle *M*, and the weight of both veſſels together found a ſecond time; by which we know the diminution of bulk the airs ſuffer on being mixed. Laſtly, the bottle *M* is taken off, and the veſſel *A* weighed again by itſelf, which gives the quantity of reſpirable air made uſe of. It is needleſs to determine the quantity of nitrous air by weight; becauſe, as the quantity

Fig. 10, 11.

quantity uſed is always ſufficient to produce a full diminution, a ſmall difference therein makes no ſenſible one in the diminution. No ſenſible error can ariſe from any difference in the ſpecific gravity of the air; for the thing found by weighing the veſſel is the difference of weight of the included air and an equal bulk of water: which, as air is no leſs than 800 times lighter than water; is very nearly equal to the weight of a quantity of water equal in bulk to the included air. A common balance is not convenient for weighing the bottles under water, without ſome addition to it: for the lower the veſſel of air ſinks under water, the more the air is compreſſed; which makes the veſſel heavier, and thereby cauſes that end of the beam to preponderate. Hence we muſt either have the index placed below the beam, as in many eſſay-balances; or by ſome other means remove the centre of gravity of the beam ſo much below the centre of ſuſpenſion, as to make the balance vibrate, notwithſtanding the tendency which the compreſſibility of the air in the veſſel has to prevent it.

In this manner of determining the quantities of the air by weight, care muſt be taken to proportion the lengths of the copper wires in ſuch a manner that the ſurface of the water in *A* and *M* ſhall be on the ſame level, when both have the uſual quantity of air in them; as otherwiſe ſome errors will ariſe from the air being more compreſſed in one than the other. This precaution, indeed, does not entirely take away the error, as the level of the water in *M* is not the ſame after the airs are mixed that it was before; but in veſſels of the ſize uſed by our author, this error could never be equal to the 500dth part of the whole; which therefore is quite inconſiderable: but even if it was much greater, it could be of no conſequence, as it would always be the ſame in trying the ſame kind of air.

The veſſel *A* (fig. 10) uſed in theſe experiments, holds 282 grains of water, and is the quantity denominated *one meaſure* by our author. There are three bottles for making the mixture, with a meaſure *B* (fig. 12.) for the nitrous air adapted to each. The firſt of theſe holds three meaſures, and the correſponding meaſure one and one-fourth of the former meaſure; the ſecond bottle holds ſix, and the correſponding meaſure 2½; the third holds 12, and the correſponding meaſure five. The firſt bottle and meaſure are made uſe of in trying common air, and the others for the dephlogiſticated or purer kinds. As the ſame quantity of reſpirable air is always made uſe of, 1¼ meaſure of nitrous air is added to one of the common atmoſpherical kind; and in trying very pure dephlogiſticated air, five meaſures of the nitrous kind are made uſe of; and our author is of opinion, that there is no kind of air ſo pure as to require a greater quantity of nitrous air. The way by which it is known whether a ſufficient quantity of nitrous air has been added, is to obſerve the bulk of the mixture; for if that is not leſs than one meaſure, that is, than the reſpirable air alone, it is a ſign that the quantity of nitrous air is ſufficient, or that it will produce the proper diminution, unleſs it be very impure. It muſt be obſerved, however, that though the quantity of reſpirable air will always be nearly the ſame, as being put in by meaſure, yet the obſerved diminution will commonly require ſome correction. For example, ſuppoſe that the obſerved diminution was 2.353 meaſures, and that the quantity of reſpirable air was found to be .985 of a meaſure; then the obſerved diminution muſt be increaſed by .035, in order to have the true diminution, or that which would have been produced if the reſpirable air made uſe of had been exactly one meaſure; whence the true diminution is 2.388.

In weighing common air, our author ſomewhat abridges the proceſs above deſcribed. He does not weigh the veſſel *A*, but only the bottle *M* with the nitrous air in it; then mixes the airs, and again weighs the ſame bottle with the mixture in it, and finds the increaſe of weight; which added to one meaſure, is very nearly the true diminution whether the quantity of common air made uſe of was a little more or a little leſs than one meaſure. The reaſon of this is, that as the diminution produced by the mixture of common and nitrous air is only a little greater than the bulk of the common air, the bulk of the mixture will be very nearly the ſame whether the bulk of the common air be a little greater or a little leſs than one meaſure. Let us ſuppoſe, for example, that the quantity of common air made uſe of is exactly one meaſure, and that the diminution of bulk on mixing is 1.08 of a meaſure; then muſt the increaſe of the weight of the bottle *M*, on adding the common air, be .08 of a meaſure. Let us next ſuppoſe that the quantity of common air made uſe of is 1.02 of a meaſure; then will the diminution, on adding the nitrous air, be $1.08+\frac{1.02}{1.00}$ or 1.1016 of a meaſure; and conſequently the increaſe of the weight of the bottle *M* will be 1.1016—1.02, or .0816 of a meaſure, almoſt exactly the ſame as if preciſely one meaſure of common air had been made uſe of.

28
Of adding the nitrous to the reſpirable.

The ſame bottle is made uſe of, viz. that which holds three meaſures, when the nitrous is added to the reſpirable air. In this experiment the bottle *M* is firſt weighed without any air in it, and then weighed again when full of reſpirable air, which gives the quantity of the latter made uſe of. The nitrous air is then put into the veſſel *A*, and weighed together with the bottle *M*; after which, having mixed them together, the diminution takes place, and they are weighed again, in order to diſcover its quantity. In this method a ſmaller quantity of nitrous air is neceſſary than in the former. In the firſt method, it was found that the diminution was ſcarce ſenſibly leſs when one meaſure of nitrous air was uſed than with a much larger quantity; ſo that one meaſure may be accounted fully ſufficient. Our author, however, choſe to employ 1¼ meaſure, leſt the nitrous air ſhould be impure. There was no ſenſible diminution whether the orifice of the veſſel *A* opening into the bottle *M* was $\frac{1}{10}$ or ⅛th of an inch; that is, whether the air eſcaped in ſmall or large bubbles: the diminution was rather greater when the bottle was ſhaken briſkly than otherwiſe; but all the difference that could be perceived between theſe two methods of ſhaking did not exceed .01 of a meaſure. The diminution, however, was remarkably leſs when the bottle was not ſhaken at all; being at firſt only 0.9; in about three minutes it increaſed to 0 93: and after being ſhaken for about a minute, it increaſed to 0.99; but when gently ſhaken at firſt, the diminution was 1.08 on mixing, and did not ſenſibly increaſe after that time. Some difference was found to ariſe from the length of time the air took up in paſſing from one veſſel to another. When it took up 80 ſeconds, for inſtance, in paſſing from the one bottle into the other, there was a difference of 5 hundredth-parts more than when it took up only 22 ſeconds, and about 2 hundredth parts more than when it took up 45 ſeconds; but at other times the difference was leſs. As the hole in the plate *Dd*, however, was always the ſame in our author's experiments, the time taken up by the air in paſſing from one veſſel into the other varied ſo little that no perceptible difference could ariſe from that cauſe.

29 Variations ariſing from the ſize of the bottles and quality of the water.

A greater difference aroſe from the ſize of the bottles and quality of the water made uſe of. When the ſmall bottle, holding three meaſures, was uſed, and filled with diſtilled water, the diminution of common air was uſually 1.08; but when the bottle was filled with water from the tub, it was .05 leſs. Uſing the bottle which held 12 meaſures, and filled with diſtilled water, the diminution was about 1.15; and with the ſame bottle filled with water from the tub it was uſually 1.08. "The reaſon of this (ſays Mr Cavendiſh) is, that water has the power of abſorbing a ſmall quantity of nitrous air; and the more dephlogiſticated the water is, the more of this air it can abſorb. If the water is of ſuch a nature alſo as to froth or form bubbles on letting in the common air, the diminution is remarkably leſs than in other water. In general the diminution was nearly as great with rain as with diſtilled water; but ſometimes the former would froth a good deal: in which caſe it was no better than water fouled with oak-ſhavings. This difference of diminution, according to the nature of the water, is a very great inconvenience, and ſeems to be the chief cauſe of uncertainty in trying the purity of the air; but it is by no means peculiar to this method, being equally great in that of Fontana's. In his method indeed it makes little difference whether the water be diſpoſed to froth or not; but this is no great advantage, as it is eaſy to find water which will not froth; though it ſhews plainly how little any of the experiments hitherto made on the purity of air can be depended upon." The beſt method of obviating this inconvenience is to be always careful to uſe the ſame kind of water: our author always made uſe of diſtilled water; but found that even this was ſometimes endowed with a greater power of abſorbing nitrous air than at others: and with a view to remedy this, he made the following experiment. Some diſtilled water being purged of its air by boiling, one part was kept for a week in a bottle with dephlogiſticated air, and frequently ſhaken; the other part being treated in the ſame manner with phlogiſticated air. By a mean of three different trials the teſt of common air tried with the firſt of theſe waters was 1.139; the diminution ſuffered by ſhaking nitrous air in it for two ſeconds being about 0.285. The teſt of the ſame air tried with the other water was 1.054, and the diminution by nitrous air only 0.09; the heat of the water in the tub and of the diſtilled waters being 45°. The heat of the water in the tub and the diſtilled waters was then raiſed to 67°; when the teſt of the ſame air tried by the firſt water was 1.100, and by the latter 1.044; the diminution of nitrous air with the firſt water being 0.235; by the latter 0.089. Hence it might ſeem that the obſerved teſt ought to be corrected by the ſubtraction of $\frac{4}{10}$ths of the diminution which nitrous air ſuffers by being ſhaken in the water, and adding .002 for every three degrees of heat above 0; but though this correction will undoubtedly diminiſh the error, he is of opinion that it will not by any means take it away entirely; and from ſome circumſtances it appears that diſtilled water poſſeſſes a property of abſorbing different quantities of nitrous air independent of its heat.

30 Attempt to remedy the inconveniencies from the different quality of the water.

31 Why the diminution is leſs when the nitrous is added to the reſpirable air.

In the ſecond method, viz. when the nitrous acid is added to the common air the diminution is conſiderably leſs than in the other; the reaſon of which is, that when nitrous and common air are mixed together, the former is deprived of part of its phlogiſton, and is thereby converted into phlogiſticated nitrous acid, and in that ſtate is abſorbed by the water; beſides that the common air is phlogiſticated, and thereby diminiſhed: ſo that the whole diminution on mixing is equal to the bulk of nitrous air which is turned into acid, added to the diminution which the common air ſuffers by being phlogiſticated. Now it appears, that when a ſmall quantity of nitrous air comes in contact with a large one of common air, the former is more completely deprived of its phlogiſton, and abſorbed by the water in a more dephlogiſticated ſtate than when a ſmall quantity of common air comes into contact with a large quantity of nitrous: in the ſecond method, therefore, where ſmall portions of nitrous air come in contact with a large quantity of common air, the former as has been juſt obſerved, is more deprived of its phlogiſton; and therefore a ſmaller quantity of it is required to phlogiſticate the common air than in the former method where ſmall portions of common air come in contact with a large quantity of nitrous air; ſo that a leſs quantity of the nitrous air is abſorbed in the ſecond method than in the firſt. The common air moſt probably ſuffers an equal diminution in both caſes.

Another proof that a ſmaller quantity of nitrous air is required in this method than the former is, that if common air be mixed with a quantity of nitrous air not ſufficient to phlogiſticate it, the mixture will be more phlogiſticated if the nitrous be added ſlowly to the common air without being in contact with water; the mixture will be found to be ſtill more phlogiſticated than in the ſecond method where the two airs are in contact with water at the time of mixing.

32 Concluſions from Mr Cavendiſh's experiments.

The final reſult of Mr Cavendiſh's experiments on this ſubject is, that nitrous air uſed in the firſt method does not phlogiſticate common air more than three-fourths of the ſame quantity uſed in the ſecond way; and not ſo much as one half of the quantity uſed in the third way, viz. by adding the nitrous air ſlowly to the other, without being in contact with water.

33 Of the different properties of nitrous air.

With reſpect to the quality of nitrous air uſed in theſe experiments, our author obſerves that it may vary in two reſpects. 1. In purity; that is, in being more or leſs mixed with phlogiſticated or other air. 2. In two parcels of equally pure air, it is poſſible that one parcel may contain more phlogiſton than the other. A difference in the ſecond reſpect will cauſe an error in the teſt, in whatever proportion it be mixed with the reſpirable air; but if it differs in the firſt reſpect, it will ſcarcely cauſe any error unleſs it be uncommonly impure; provided care is taken to uſe a quantity ſufficient to make a full diminution. It muſt be obſerved, however, that if the nitrous air be mixed with fixed air, an error will be occaſioned, becauſe part of the latter is abſorbed while the teſt is trying; but this will hardly be the caſe, unleſs either the metal from which it is procured be covered with ruſt, or unleſs the water in which it is received contain much calcareous earth ſuſpended by fixed air; as in that caſe, if any of the nitrous acid comes over with the air, it will diſſolve the calcareous earth, and ſeparate ſome fixed air.

To determine whether it be poſſible for nitrous air to differ in the ſecond reſpect, our author procured ſome from quickſilver, copper, braſs, and iron: in making experiments with which, he found that the difference between the teſts tried with the three firſt kinds of air was not greater than what might proceed from the error of the experiment; but thoſe with the air from iron .015 greater than the reſt. From other experiments it appeared that the nitrous air from iron was not only more impure than that from other metals, but that the pure portion it contained had leſs phlogiſton in it than that from copper or quickſilver. He is of opinion, however, that copper affords nitrous air ſufficiently pure for experiments of this kind without having recourſe to quickſilver, as Mr Cavallo adviſes.

In ſome of his experiments, Mr Cavendiſh had occaſion to uſe a larger apparatus, which is repreſented fig. 13. *A* repreſents a bottle containing nitrous air inverted into the tub of water *DE*. *B* is bottled fitted with a bent glaſs tube *C*. This bottle is to be filled with common air without any water, and is firſt ſlightly warmed by the hand: the end of the glaſs tube is then put into the bottle of nitrous air as repreſented in the figure. As the bottle *B* cools, a little nitrous air runs into it, which inſtantly loſes its elaſticity in conſequence of coming into contact with the atmoſpherical air. This condenſation occaſions an influx of freſh nitrous air, and ſo on till the whole is exhauſted. By this means the nitrous air is added ſlowly to the other without coming into contact with water, the whole of it has run out from the bottle *A* into *B*; after which the water flows in to ſupply the vacancy occaſioned by the diminution.

EUDOSIA, (ATHENIA, before her converſion to Chriſtianity), a celebrated lady, the daughter of Leontius, philoſopher of Athens; who gave her ſuch a learned education, that at his death, he left her only a ſmall legacy, ſaying ſhe was capable to make her own fortune; but pleading at Athens without ſucceſs againſt her two brothers, for a ſhare in her father's eſtate, ſhe carried her cauſe perſonally by appeal to Conſtantinople; recommended herſelf to Pulcheria, the ſiſter of the emperor Theodoſius the younger; embraced Chriſtianity, was baptized by the name of *Eudoſia*, and ſoon after married to the emperor. Their union laſted a conſiderable time: but a difference at laſt taking place, on account of the emperor's jealouſy excited by Chryſapius the eunuch, ſhe retired to Jeruſalem, where ſhe ſpent many years in building and adorning churches and in relieving the poor. Dupin ſays, that ſhe did not return thence till after the emperor's death: but Cave tells us, that ſhe was reconciled to him, returned to Conſtantinople, and continued with him till his death; after which ſhe went again to Paleſtine, where ſhe ſpent the remainder of her life in pious works. She died in the year 460, according to Dupin; or 459, according to Cave: the latter obſerves, that on her death-bed ſhe took a ſolemn oath, by which ſhe declared herſelf entirely free from any ſtains of unchaſtity. She was the author of a paraphraſe on the eight firſt books of the Old Teſtament in heroic verſe; and of a great number of poems, which are loſt.

EUDOXIANS, a party or ſect of heretics in the fourth century, ſo denominated from their leader Eudoxius, patriarch of Antioch and Conſtantinople, a great defender of the Arian doctrine. The Eudoxians adhered to the errors of the Arians and Eunomians, maintaining, that the Son was created out of nothing; that he had a will diſtinct and different from that of the Father, &c.

EVE. See ADAM.

EVE, the mother of all mankind; who being deluded by the ſerpent, occaſioned the fall, and all its diſmal conſequences. See ADAM.

EVELYN (John), a moſt learned and ingenious writer and natural philoſopher, was born at Wotton in Surry, the ſeat of his father, in 1620. After making the tour of Europe, he returned to England about the year 1651, and lived very retired at his rural retreat, Say's Court, near Deptford in Kent; where his diſguſt at the violence and confuſion of the times operated ſo far upon his ſtudious diſpoſition, that he actually propoſed to Mr Boyle the eſtabliſhing a kind of college for perſons of the ſame turn of mind, where they might aſſociate together without care or interruption. It was owing to Mr Evelyn's gratitude to the place of his education, that Oxford became poſſeſſed of the famous Arundelian marbles; which he perſuaded the Lord Henry Howard to beſtow on that univerſity. He was very aſſiduous in tranſmitting to the royal ſociety whatever fell within the compaſs of his enquiries; and uſed humbly to ſtyle himſelf *a pioneer in the ſervice*. When the number of books he publiſhed is conſidered, the many he left behind him unfiniſhed and unpubliſhed, and the variety of ſubjects on which he employed his time, his induſtry and application are aſtoniſhing. "His life (ſays the honourable Mr Walpole) was a courſe of inquiry, ſtudy, curioſity, inſtruction, and benevolence. The works of the Creator, and the mimic labours of the creature, were all objects of his purſuit. He unfolded the perfections of the one, and aſſiſted the imperfections of the other. He adored from examination; was a courtier that flattered only by informing his prince, and by pointing out what was worthy for him to countenance; and was really the neighbour of the Goſpel, for there was no man that might not have been the better for him. He was one of the firſt promoters of the royal ſociety, a patron of the ingenious and indigent, and particularly ſerviceable to the lettered world; for, beſides his writings and diſcoveries he obtained the Arundelian marbles for the univerſity of Oxford, and the Arundelian library for the royal ſociety: nor is it the leaſt part of his praiſe, that he who propoſed to Mr Boyle the election of a philoſophic college for retired and ſpeculative perſons, had the honeſty to write in defence of active life againſt Sir George Mackenzie's Eſſay on Solitude. He knew that retirement in his own hands was induſtry and benefit to mankind; but in thoſe of others, lazineſs and inutility." There are five ſmall prints of this gentleman's journey from Rome to Naples, drawn and etched by him; and among his publiſhed works are, 1. A Character of England; 2. The State of France; 3. An Eſſay on the firſt book of Lucretius *De rerum natura*; 4. The

French gardener; 5. A Panegyric on King Charles II's coronation; 6. *Fumiſugum,* or the inconveniences of the air and ſmoke of London diſſipated; 7. The Hiſtory and Art of Engraving on Copper; 8. A parallel between the ancient architecture and the modern; 9. Sylva, or a diſcourſe of foreſts-trees; and ſeveral others. This amiable gentleman died, full of age and honour, in 1706. His ſon John Evelyn, born in 1654, diſtinguiſhed himſelf by his elegant tranſlations and poems: He was one of the commiſſioners of the revenue in Ireland; but died early in life, in 1698.

EVERGETES, a ſirname ſignyfying *benefactor,* given to Philip of Macedonia, and to Antigonus Doſon, and Ptolemy of Egypt. It was alſo commonly given to the kings of Syria and Pontus, and we often ſee among the former an Alexander Evergetes, and among the latter a Mithridates Evergetes. Some of the Roman emperors alſo claimed that epithet of Benevolent and Humane.

EVERGREEN, in gardening, a ſpecies of perennials, which continue their verdure, leaves, &c. all the year: ſuch are hollies, phillyreas, lauriſtinuſes, bays, pines, firs, cedars of Lebanon, &c.

EVERLASTING PEA. See LYTHYRUS.

EVES DROPPERS. See *EAVES-Droppers.*

EVESHAM, or EVESHOLM, commonly called *Eſam,* a town of Worceſterſhire, ſeated on a gentle aſcent from the river Avon, over which there is a bridge of ſeven arches. It is 95 miles from London, 14 miles from Worceſter, and has a harbour for barges. It is an old borough, reckoned the ſecond in the county; and ſends two members to parliament. It had formerly an abbey with a mitred abbot; which abbey when ſtanding was one of the largeſt and moſt ſtately of any in the kingdom. It was governed by a bailiff, till king James I. at the requeſt of his ſon Prince Henry, give it a charter for a mayor, 7 aldermen, 12 capital burgeſſes, a recorder, and chamberlain, who are all of the common council, with 24 other burgeſſes called aſſiſtants. Four of the aldermen, and the mayor for the time being, are juſtices of the peace; and of oyer and terminer, and of goal delivery, for all offences in the corporation, except high treaſon; and the corporation, has power to try and execute felons within the borough. Here are two pariſh-churches; but the bells of both have been removed to a beautiful old tower which was one of the gates of the abbey. This town is noted for the great victory obtained near it by Prince Edward, afterwards King Edward I. over Simon Montford, the great earl of Leiceſter, who was killed in the battle. There is an open proſpect from hence of the ſpacious valley called the *vale of Eveſham* or *vale of Glouceſter,* which ſo abouds with the beſt of corn, as well as paſture for ſheep, that is reckoned the granary of all theſe parts. The vale runs all along the banks of the Avon, from Tewkeſbury to Perſhore, and to Stratford in Warwickſhire, and the river is ſo far navigable. It has a weekly market and four fairs. The market-houſe built by Sir Edward Hobby has its upper apartments uſed by the corporation for a ſeſſions-houſe, and formerly for the aſſizes of the county. There are conſiderable garden-grounds around the place, the produce of which ſupplies the adjacent towns.

EUGENE (Francis), prince of Savoy, deſcended from Carignan, one of the three branches of the houſe of Savoy, and ſon of Eugene Maurice, general of the Swiſs and Griſons, governor of Campagne, and earl of Soiſſons, was born in 1663. Louis XIV. to whom he became afterwards ſo formidable an enemy, thought him ſo unpromiſing a youth, that he refuſed him preferment both in the church and the ſtate, thinking him too much addicted to pleaſure to be uſeful in either. Prince Eugene, in diſguſt, quitted France; and, retiring to Vienna, devoted himſelf to the imperial ſervice. The war between the emperor and the Turks afforded the firſt opportunity of exerting his military talents; and every campaign proved a new ſtep in his advancement to the higheſt offices in the army. He gave the Turks a memorable defeat at Zenta; commanded the German forces in Italy, where he foiled marſhal Villeroy in every engagement, and at length took him priſoner. Our limits do not allow a detail of his campaigns; but prince Eugene diſtinguiſhed himſelf greatly, when the emperor and queen Anne united againſt the exorbitant power of Louis XIV. He died at Vienna in the year 1736; and was as remarkable for his modeſty and liberality, as for his abilities in the field and the cabinet.

EUGENIA, the YAMBOO: A genus of the monogynia order, belonging to the icoſandria claſs of plants; and in the natural method ranking under the 19th order, *Heſperideæ.* The calyx is quadripartite, ſuperior; the petals four; the fruit a monoſpermous quadrangular plum. There are two ſpecies, both natives of the hot parts of Aſia. They riſe from 20 to 30 feet high; and bear plum-ſhaped fruit, incloſing one nut. They are too tender to live in Britain, unleſs they are conſtantly kept in a ſtove.

EVICTION, in law, ſignifies a recovery of lands or tenements by law.

EVIDENCE, that perception of truth which ariſes either from the teſtimony of the ſenſes or from an induction of reaſon.

EVIDENCE, in law, ſignifies ſome *proof* by teſtimony of men upon oath, or by writings or records. It is called *evidence,* becauſe thereby the point in iſſue in a cauſe to be tried is to be made *evident* to the jury; for *probationes debent eſſe evidentes et perſpicuæ.* The ſyſtem of evidence, as now eſtabliſhed in our courts of common law, is very full, comprehenſive, and refined; far different from, and ſuperior to, any thing known in the middle ages; as far ſuperior in that as in all other improvements and refinements in ſcience, arts, and manners.

The nature of evidence during the ages of ignorance was extremely inperfect, and the people were incapable of making any rational improvement. Thus it was the imperfection of human reaſon that cauſed the invention and introduction of the ORDEAL, as an appeal to the Supreme Being. As men are unable to comprehend the manner in which the Deity carries on the government of the univerſe, by equal, fixed, and general laws, they are apt to imagine, that in every caſe which their paſſions or intereſt render important in their own eyes, the Supreme Ruler of all ought viſibly to diſplay his power in vindicating innocence, and puniſhing vice.

EVIL, in philoſophy, &c. is either moral or natural. Moral evil is the diſagreement between the actions of a moral agent, and the rule of thoſe actions whatever it is*.—Natural evil is, whatever deſtroys or any way diſturbs the perfection of natural beings: ſuch as blindneſs, diſeaſes, death, &c.

King's Evil, or *Scrophula*. See Medicine-*Index*.

Evil-Merodach, the ſon and ſucceſſor of Nebuchadnezzer the Great, king of Babylon, ſucceeded to the crown in the year of the world 3443; but governed the kingdom during the indiſpoſition of his father, who after ſeven years, having recovered his underſtanding, once more aſcended the throne; and, as ſome believe, impriſoned his ſon Evil-Merodach. In this confinement it is ſuppoſed that Evil-Merodach made an acquaintance and friendſhip with Jehoiachim king of Judah who had been carried to Babylon by Nebuchadnezzer. However this was, it is certain, that ſoon after his ſucceſſion to the throne, he delivered the king of Judah out of priſon, after a confinement of 37 years, heaped may favours on him, and placed him above all ~~the other~~ kings who were at the court of Babylon, (2 Kings xxv. 27. Jer. liii. 31.) Evil-Merodach reigned but one year, according to the chronology of Archbiſhop Uſher; but Dr Prideaux will have him to have reigned two years, and was ſucceeded by Neriglifſar his ſiſter's huſband, who having been at the head of a conſpiracy that put him to death, reigned in his ſtead. Others will have it, that this prince was immediately ſucceeded by his ſon Belshazzar.

EULER (Leonard), profeſſor of mathematics, member of the imperial academy of Peterſburgh, ancient director of the royal academy of Berlin, and fellow of the royal ſociety of London, as alſo correſpondent member of the royal academy of ſciences at Paris, was born at Baſil, April 15th, 1707, of reputable parents. The years of his infancy were paſſed in a rural retreat at the village of Richen, of which place his father was miniſter.—Being ſent to the univerſity of Baſil, he attended regularly the different profeſſors. As his memory was prodigious, he performed his academical taſks with uncommon rapidity; and all the time he gained by this was conſecrated to geometry, which ſoon became his favourite ſtudy. The early progreſs he made in this ſcience, only added a new ardour to his application; and thus he obtained a diſtinguiſhed place in the attention and eſteem of profeſſor John Bernouilli, who was at that time one of the firſt mathematicians in Europe. In 1723, M. Euler took his degree as maſter of arts; and delivered on that occaſion a Latin diſcourſe, in which he drew a compariſon between the philoſophy of Newton and the Carteſian ſyſtem, which was received with the greateſt applauſe. He afterwards, at his father's deſire, applied himſelf to the ſtudy of theology and the oriental languages. Though theſe ſtudies were foreign to his predominant propenſity, his ſucceſs was conſiderable even in this line: however, with his father's conſent, he returned to geometry as his principal object. He continued to avail himſelf of the counſels and inſtructions of M. Bernouilli; he contracted an intimate friendſhip with his two ſons Nicholas and Daniel; and it was in conſequence of theſe connections that he became afterwards the principal ornament of the academy of Peterſburg. The project of erecting this academy, which had been formed by Peter the Great, was executed by Catharine I.; and the two young Bernouillis being invited to Peterſburg in 1725, promiſed Euler, who was deſirous of following them, that they would uſe their utmoſt endeavours to procure for him an advantageous ſettlement in that city. In the mean time, by their advice, he applied himſelf with ardour to the ſtudy of phyſiology, to which he made a happy application of his mathematical knowledge; and he attended the medical lectures of the moſt eminent profeſſors of Baſil. This ſtudy, however, did not wholly engroſs his time: it did not even relax the activity of his vaſt and comprehenſive mind in the cultivation of other branches of natural ſcience. For while he was keenly engaged in phyſiological reſearches, he compoſed A Diſſertation on the Nature and Propagation of Sound, and an anſwer to a prize queſtion concerning the maſting of ſhips; to which the academy of ſciences adjudged the *acceſſit*, or ſecond rank, in the year 1727. From this latter diſcourſe, and other circumſtances, it appears that Euler had early embarked in the curious and important ſtudy of navigation, which he afterwards enriched with ſo many valuable diſcoveries.

M. Euler's merit would have given him an eaſy admiſſion to honourable preferment, either in the magiſtracy or univerſity of his native city, if both civil and academical honours had not been there diſtributed by lot. The lot being againſt him in a certain promotion, he left his country, ſet out for Peterſburgh, and was made joint profeſſor with his countrymen Meſſrs Hermann and Daniel Bernouilli in the univerſity of that city. At his firſt ſetting out in his new career, he enriched the academical collection with many memoirs, which excited a noble emulation between him and the Bernouillis; and this emulation always continued, without either degenerating into a ſelfiſh jealouſy, or producing the leaſt alteration in their friendſhip. It was at this time that he carried to new degrees of perfection the integral calculus, invented the calculation of ſinuſes, reduced analytical operations to a greater ſimplicity, and thus was enabled to throw new light on all the parts of mathematical ſcience. In 1730, he was promoted to the profeſſorſhip of natural philoſophy; and in 1733 he ſucceeded his friend D. Bernouilli in the mathematical chair. In 1735, a problem was propoſed by the academy which required expedition, and for the ſolution of which ſeveral eminent mathematicians had demanded the ſpace of ſome months. The problem was ſolved by Euler in three days, to the great aſtoniſhment of the academy; but the violent and laborious efforts it coſt him threw him into a fever, which endangered his life, and deprived him of the uſe of his right eye. The academy of ſciences at Paris, which in 1738 had adjudged the prize to his memoir Concerning the Nature and Properties of Fire, propoſed for the year 1740 the important ſubject of the ſea-tides; a problem whoſe ſolution required the moſt arduous calculations, and comprehended the theory of the ſolar ſyſtem. Euler's diſcourſe on this queſtion was adjudged a maſter-piece of analyſis and geometry; and it was more honourable for him to ſhare the academical prize with ſuch illuſtrious competitors as Colin Maclaurin and Daniel Bernouilli, than to have carried it away from rivals of leſs magnitude. Rarely, if ever, did ſuch a brilliant competition adorn the annals of the academy; and no ſubject perhaps, propoſed by that learned body was ever treated with ſuch accuracy of inveſtigation and force of genius, as that which here diſplayed the philoſophical powers of theſe three extraordinary men.

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* See Moral Philoſophy.

In the year 1741, M. Euler was invited to Berlin to augment the luſtre of the academy, that was there riſing into fame. He enriched the laſt volume of the miſcellanies *(melanges)*, of Berlin with five memoirs, which make an eminent, perhaps the principal figure in that collection. Theſe were followed with an aſtoniſhing rapidity by a great number of important reſearches, which are ſcattered through the memoirs of the Pruſſian academy; of which a volume has been regularly publiſhed every year ſince its eſtabliſhment in 1744. The labours of Euler will appear more eſpecially aſtoniſhing, when it is conſidered, that while he was enriching the Academy of Berlin with a prodigious number of memoirs, on the deepeſt parts of mathematical ſcience, containing always ſome new points of view, often ſublime truths, and ſometimes diſcoveries of great importance; he did not diſcontinue his philoſophical contributions to the Academy of Peterſburg, which granted him a penſion in 1742, and whoſe memoirs diſplay the marvellous fecundity of Euler's genius. It was with much difficulty that this great man obtained, in 1766, permiſſion from the king of Pruſſia to return to Peterſburg, where he deſired to paſs the reſt of his days. Soon after his return, which was graciouſly rewarded by the munificence of Catharine II. he was ſeized with a violent diſorder, which terminated in the total loſs of his ſight. A cataract, formed in his left eye, which had been eſſentially damaged by a too ardent application to ſtudy, deprived him entirely of the uſe of that organ. It was in this diſtreſſing ſituation that he dictated to his ſervant, a tailor's apprentice, who was abſolutely devoid of mathematical knowledge, his knowledge of algebra; which by their intrinſical merit, in point of perſpicuity and method, and the unhappy circumſtances in which they were compoſed, have equally excited applauſe and aſtoniſhment. This work, though purely elementary, diſcovers the palpable characteriſtics of an inventive genius; and it is here alone that we meet with a complete theory of the analyſis of Diophantus.

About this time M. Euler was honoured by the Academy of Sciences at Paris with the place of one of the foreign members of that learned body; and, after this, the academical prize was adjudged to three of his memoirs, *Concerning the Inequalities in the Motions of the Planets*. The two prize queſtions propoſed by the ſame academy for 1779 and 1772 were deſigned to obtain from the labours of aſtronomers *a more perfect Theory of the Moon*. M. Euler, aſſiſted by his eldeſt ſon, was a competitor for theſe prizes, and obtained them both. In this laſt memoir, he reſerved for farther conſideration ſeveral inequalities of the moon's motion, which he could not determine in his firſt theory, on account of the complicated calculations in which the method he then employed had engaged him. He had the courage afterward to review his whole theory, with the aſſiſtance of his ſon and Meſſrs Krafft and Lexell, and to purſue his reſearches until he had conſtructed the new tables, which appeared, together with the great work, in 1772. Inſtead of confining himſelf, as before, to the fruitleſs integration of three differential equations of the ſecond degree, which are furniſhed by mathematical principles, he reduced them to three ordinates, which determine the place of the moon; he divided into claſſes all the inequalites of that planet, as far as they depend either on the elongation of the ſun and moon, or upon the eccentricity, or the parallax, or the inclination of the the lunar orbit. All theſe means of inveſtigation, employed with ſuch art and dexterity as could only be expected from an analytical genius of the firſt order, were attended with the greateſt ſucceſs; and it is impoſſible to obſerve, without admiration, ſuch immenſe calculations on the one hand, and on the other the ingenious methods employed by this great man to abridge them, and to facilitate their application to the real motion of the moon. But this admiration will become aſtoniſhment, when we conſider at what period and in what circumſtances all this was effectuated by M. Euler. It was when he was totally blind, and conſequently obliged to arrange all his computations by the ſole powers of his memory and his genius. It was when he was embarraſſed in his domeſtic circumſtances by a dreadful fire, that had conſumed great part of his ſubſtance, and forced him to quit a ruined houſe, of which every corner was known to him by habit, which, in ſome meaſure, ſupplied the place of ſight. It was in theſe circumſtances that Euler compoſed a work which, alone, was ſufficient to render his name immortal. The heroic patience and tranquillity of mind which he diſplayed here, needs no deſcription: and he derived them not only from the love of ſcience, but from the power of religion. His philoſophy was too genuine and ſublime to ſtop its analyſis at mechanical cauſes; it led him to that divine philoſopy of religion which ennobles human nature, and can alone form a habit of true magnanimity and patience in ſuffering.

Some time after this, the famous Wentzell, by couching the cataract, reſtored Mr Euler's ſight; but the ſatisfaction and joy that this ſucceſsful operation produced, were of ſhort duration. Some inſtances of negligence on the part of his ſurgeons, and his own impatience to uſe an organ, whoſe cure was not completely finiſhed, deprived him of his ſight a ſecond time; and this relapſe was accompanied with tormenting pain. He, however, with the aſſiſtance of his ſons, and of Meſſrs Krafft and Lexell, continued his labours; neither the loſs of his ſight nor the infirmities of an advanced age could damp the ardour of his genius. He had engaged to furniſh the academy of Peterſburgh with as many memoirs as would be ſufficient to complete its acts for 20 years after his death. In the the ſpace of ſeven years he tranſmitted to the academy, by Mr Golſwin, above 70 memoirs, and above 200 more, which were reviſed and completed by the author of this paper. Such of theſe memoirs as were of ancient date were ſeparated from the reſt, and form a collection that was publiſhed in the year 1783, under the title of *Analytical Works*.

Euler's knowledge was more univerſal than could be well expected in one, who had purſued with ſuch unremitting ardour mathematics and aſtronomy as his favourite ſtudies. He had made a very conſiderable progreſs in medical, botanical, and chemical ſcience. What was ſtill more extraordinary, he was an excellent ſcholar, and poſſeſſed what is generally called *eru-*

dition in a very high degree. He had read, with attention and taſte, the moſt eminent writers of ancient Rome; the civil and literary hiſtory of all ages and all nations was familiar to him; and foreigners who were only acquainted with his works, were aſtoniſhed to find in the converſation of a man whoſe long life ſeemed ſolely occupied in mathematical and phyſical reſearches and diſcoveries, ſuch an extenſive acquaintance with the moſt intereſting branches of literature. In this reſpect, no doubt, he was much indebted to a very uncommon memory, which ſeemed to retain every idea that was conveyed to it, either from reading or from meditation. He could repeat the Æneid of Virgil, from the beginning to the end, without heſitation, and indicate the firſt and laſt line of every page of the edition he uſed.

Several attacks of a vertigo, in the beginning of September 1783, which did not prevent his calculating the motions of the aeroſtatical globes, were, nevertheleſs the forerunners of his mild and happy paſſage from this ſcene to a better. While he was amuſing himſelf at tea with one of his grandchildren, he was ſtruck with an apoplexy, which terminated his illuſtrious career at the age of 76. His conſtitution was uncommonly ſtrong and vigorous; his health was good; and the evening of his long life was calm and ſerene, ſweetened by the fame that follows genius, the public eſteem and reſpect that are never with-held from exemplary virtue, and ſeveral domeſtic comforts which he was capable of feeling, and therefore deſerved to enjoy.

EULOGY, Eulogia, in church hiſtory. When the Greeks have cut a loaf or piece of bread to conſecrate it, they break the reſt into little bits, and diſtribute it among the perſons who have not yet communicated, or ſend it to perſons that are abſent; and theſe pieces of bread are what they call *eulogies*. The word is Greek, ευλογια, formed of ευ *bene*, "well," and λεγω *dico*, "I ſay, ſpeak;" q. d. *benedictum*, "bleſſed."

The Latin church has had ſomething like eulogies for a great may ages; and thence aroſe the uſe of their holy bread.

The name *eulogy* was likewiſe given to loaves or cakes brought to church by the faithful to have them bleſſed.

Laſtly, the uſe of the term paſſed hence to mere preſents made to a perſon without any benediction. See the Jeſuit Gretſer, in his *Treatiſe de Benedictionibus & Maledictionibus*, lib. ii. cap. 22, 24, &c. where he treats of eulogies thoroughly.

From a paſſage in Bolandus, on the life of St Melaine, cap. 4. it appears, that eulogies were not only of bread, but any kind of meat bleſſed and hallowed for that purpoſe. Add, that almoſt every body bleſſed and diſtributed eulogies; not only biſhops and prieſts, but even hermits, though laymen, made a practice of it. Women alſo would ſometimes ſend eulogies.

The wine ſent as a preſent was alſo held an eulogy. Bolandus remarks farther, that the euchariſt itſelf was alſo called *eulogy*.

Eulogy, likewiſe means an encomium on any perſon, on account of ſome virtue or good quality.

EUMARIDES, of ευμαρης "eaſy," among the ancients, a kind of ſhoes common to men and women.—The eumarides were uſed for pomp and delicacy, being neat, and painted with various colours.

EUMENES, a Greek officer in the army of Alexander, ſon of a charioteer. He was the moſt worthy of all the officers of Alexander to ſucceed after the death of his maſter. He conquered Paphlagonia, and Cappadocia, of which he obtained the government, till the power and jealouſy of Antigonus obliged him to retire. He joined his forces to thoſe of Perdiccas, and defeated Craterus and Neoptolemus. Neoptolemus periſhed by the hand of Emenes. When Craterus had been killed during the war, his remains received an honourable funeral from the hand of the conqueror; and Eumenes, after weeping over the aſhes of a man who once was his deareſt friend, ſent his remains to his relations in Macedonia. Eumenes fought againſt Antipater and conquered him; and after the death of Perdiccas his ally, his arms were directed againſt Antigonus, by whom he was conquered A. U. C. 433, chiefly by the treacherous conduct of his officers. This fatal battle obliged him to diſband the greateſt part of his army to ſecure himſelf a retreat: and he fled only with 700 faithful attendants to a fortified place on the confines of Cappadocia, called *Nora*, where he was ſoon beſieged by the conqueror. He ſupported the ſiege for a year with courage and reſolution, but ſome diſadvantageous ſkirmiſhes ſo reduced him, that his ſoldiers, grown deſperate, and bribed by the offers of the enemy, had the infidelity to betray him into the hands of Antigonus. The conqueror, from ſhame or remorſe, had not the courage to viſit Eumenes; but when he was aſked by his officers, in what manner he wiſhed him to be kept, he anſwered, keep him as carefully as you would keep a lion. This ſevere command was obeyed; but the aſperity of Antigonus vaniſhed in a few days, and Eumenes, delivered from the weight of chains, was permitted to enjoy the company of his friends. Even Antigonus heſitated whether he ſhould not reſtore to his liberty a man with whom he had lived in the greateſt intimacy while both ſubſervient to the command of Alexander; and theſe ſecret emotions of pity and humanity were not a little increaſed by the petitions of his ſon Demetrius for the releaſe of Eumenes. But the calls of ambition prevailed; and when Antigonus recollected what an active enemy he had in his power, he ordered Eumenes to be put to death in the priſon. His bloody commands were executed 315 years before the Chriſtian era. Such was the end of a man who raiſed himſelf to power by merit alone. His ſkill in public exerciſes firſt recommended him to the notice of Philip; and under Alexander, his attachment and fidelity to the royal perſon, and particularly his military accompliſhments, promoted him to the rank of a general. Even his enemies revered him; and Antigonus, by whoſe orders he periſhed, honoured his remains with a ſplendid funeral, and conveyed his aſhes to his wife and family in Cappadocia. It has been obſerved, that Eumenes had ſuch an univerſal influence over the ſucceſſors of Alexander, that none during his lifetime dared to aſſume the title of king.

Eumenes I. king of Pergamus, who ſucceeded his uncle Philetærus about 264 years before Chriſt. He made war againſt Antiochus the ſon of Seleucus, and enlarged his poſſeſſions by ſeizing upon many of the cities of the kings of Syria. He lived in alliance with the Romans, and made war againſt Pruſias king of

Bithynia. He was a great patron of learning; but being much given to wine, he died of an exceſs in drinking, after a reign of 22 years. He was ſucceeded by Attalus.

Eumenes II. ſucceeded his father Attalus on the throne of Aſia and Pergamus. His kingdom was ſmall and poor, but he rendered it powerful and opulent; and his alliance with the Romans did not a little contribute to the encreaſe of his dominions after the victories obtained over Antiochus the Great. He carried his arms againſt Pruſias and Antigonus; and died 160 years before Chriſt, after a reign of 40 years, leaving the kingdom to his ſon Attalus II. He has been admired for his benevolence and magnanimity; and his love of learning greatly enriched the famous library of Pergamus, which had been founded by his predeceſſors in imitation of the Alexandrian collection of the Ptolemies. His brothers were ſo attached to him and devoted to his intereſt, that they enliſted among his body-guards to ſhow their fraternal fidelity.

Eumenes, a celebrated orator of Athens about the beginning of the fourth century. Some of his harangues and orations are extant. An hiſtorical writer in Alexander's army.

EUMENIDES, a name given to the furies by the ancients. They ſprang from the blood of the wound which Cœlus received from his ſon Saturn. According to others they were daughters of Earth, and conceived from the blood of Saturn. Some make them daughters of Acheron and Night, or Pluto and Proſerpine. According to the more received opinions, they were three in number, Tiſiphone, Megara, and Alecto, to which ſome add Nemeſis. Plutarch mentions only one called *Adraſta*, daughter of Jupiter and Neceſſity. They were ſuppoſed to be the miniſters of the vengeance of the gods. They were ſtern and inexorable; and were always employed in puniſhing the guilty upon earth as well as in the infernal regions. They inflicted their vengeance upon earth by wars, peſtilence and diſſenſions, and by the ſecret ſtings of conſcience; and in hell they puniſhed the guilty by continual flagellation and torments. They were alſo called *Furiæ Erinnys*. Their worſhip was almoſt univerſal; and people dared not to mention their names or fix their eyes upon their temples. They were honoured with ſacrifices and libations; and in Achaia they had a temple, which when entered by any one guilty of a crime, ſuddenly rendered him furious, and deprived him of the uſe of his reaſon. In the ſacrifices, the votaries uſed branches of cedar and of alder, hawthorn, ſaffron, and juniper; and the victims were generally turtle-doves and ſheep, with libations of wine and honey. They were uſually repreſented with a grim and frightful aſpect, with a black and bloody garment, and with ſerpents wreathing round their head inſtead of hair. They held a burning torch in one hand and a whip of ſcorpions in the other; and were always attended by Terror, Rage, Paleneſs, and Death. In hell they were ſeated around Pluto's throne, as the miniſters of his vengeance.

EUMENIDIA, feſtivals in honour of the Eumenides, called by the Athenians σεμναι ϑεαι "venerable goddeſſes." They were celebrated once every year, with ſacrifices of pregnant ewes, with offerings of cakes made by the moſt eminent youths, and libations of honey and wine. At Athens none but free-born citizens were admitted, ſuch as had led a life the moſt virtuous and unſullied.

EUMOLPIDES, the prieſts of Ceres at the celebration of her feſtivals at Eleuſis. They were deſcended from Eumolpus, a king of Thrace, who was made prieſt of Ceres by Erechtheus king of Athens. He became ſo powerful after his appiontment to the prieſthood, that he maintained a war againſt Erechtheus. This war proved fatal to both. Erechtheus and Eumolpus were both killed, and peace was re-eſtabliſhed among their deſcendants, on condition that the prieſthood ever remained in the family of Eumolpus, and the regal power in the houſe of Erechtheus. The prieſthood remained in the family of Eumolpus for 1200 years; and this is ſtill more remarkable, becauſe he who was once appointed to the holy office was obliged to remain in perpetual celibacy.

EUMOLPUS, a king of Thrace, ſon of Neptune and Chione. He was thrown into the ſea by his mother, who wiſhed to conceal her ſhame from her father. Neptune ſaved his life and carried him into Æthiopia, where he was brought up by a woman, one of whoſe daughters he married. An act of violence to his ſiſter-in-law obliged him to leave Æthiopia, and he fled to Thrace with his ſon Iſmarus, where he married the daughter of Tegyrius, the king of the country. This connection to the royal family rendered him ambitious; he conſpired againſt his father-in-law, and fled, when the conſpiracy was diſcovered, to Attica, where he was initiated in the myſteries of Ceres of Eleuſis, and made hierophantes or high prieſt. He was afterwards reconciled to Tegyrius, and inherited his kingdom. He made war againſt Erechtheus, king of Athens, who had appointed him to the office of high prieſt, and periſhed in battle about 1380 years before the Chriſtian era. His deſcendants were alſo inveſted with the prieſthood, which remained for about 1200 years in that family.

EUNAPIUS, a native of Sardis in Lydia, a celebrated ſophiſt, phyſician, and hiſtorian, who flouriſhed in the 4th century, under the emperors Valentinian, Valens, and Gratian. He wrote "The lives of the Philoſophers and Sophiſts," in which he frequently ſhows himſelf a bitter enemy to the Chriſtians: alſo a "Hiſtory of the Cæſars, which he deduced from the reign of Claudius where Herodian left off, down to that of Arcadius and Honorius. The hiſtory is loſt; but we have the ſubſtance of it in Zoſimus, who is ſuppoſed to have done little more than copy it.

EUNOMIANS, in church hiſtory, Chriſtian heretics in the 4th century. They were a branch of Arians, and took their name from Eunomius biſhop of Cyzicus; whoſe confeſſion of faith here follows, extracted from Cave's *Hiſtoria Literaria*, vol. i. p. 223. "There is one God uncreated and without beginning; who has nothing exiſting before him, for nothing can exiſt before what is uncreated; nor with him, for what is uncreate muſt be one; nor in him, for God is a ſimple and uncompounded being. This one ſimple and eternal being is God, the creator and ordainer of all things: firſt indeed and principally of his only begotten Son; and then, through him, of all other things. For God begot, created, and made, the Son, only by his direct operation and power, before all things, and every other creature; not producing, however, any being like himſelf, or imparting any of his own proper ſubſtance to the Son: for God is immortal, uniform, indiviſible; and therefore cannot communicate any part of his own proper ſubſtance to another. He alone is unbegotten; and it is impoſſible that any other being ſhould be formed of an unbegotten ſubſtance. He did not uſe his own ſubſtance in begetting the ſon, but his will only: nor did he beget him in the likeneſs of his ſubſtance, but according to his own good pleaſure. He then created the Holy Spirit, the firſt and greateſt of all ſpirits, by his own power indeed and operation mediately, yet by the immediate power and operation of the ſon. After the Holy Spirit he created all other things in heaven and in earth, viſible and inviſible, corporeal and incorporeal, mediately by himſelf, by the power and operation of the Son," &c.

EUNOMIUS, a famous hereſiarch of the 4th century, the diſciple of Etius, but abundantly more ſubtile than his maſter, as well as more bold in propagating the opinions of his ſect, who after him are called EUNOMIANS. He was ordained biſhop of Cyzicus; but gave ſo much diſturbance by the intemperance of his zeal, that he was depoſed more than once. At laſt, tired with being toſſed about, he petitioned to retreat to the place of his birth, Dacora in Cappadocia; where he died very old about the year 374, after experiencing a variety of ſufferings. The greateſt part of his works are loſt. There is, however, beſides two or three ſmall pieces, a confeſſion of his faith remaining which Cave inſerted in his *Hiſtoria Literaria*, from a manuſcript in archbiſhop Tenniſon's library. See the preceding article.

EUNUCH, a caſtrated perſon. See the article CASTRATION.—The word is formed from ευνην εχει, q. d. *lecti curam habet*, "*guardian* or *keeper* of the bed."

In Britain, France, &c. eunuchs are never made but upon occaſion of ſome diſeaſe, which renders ſuch an operation neceſſary: but in Italy they make great numbers of children, from one to three years of age, eunuchs every year, to ſupply the operas and theatres of all Europe with ſingers. M. de la Lande, in his *Voyage d'Italie*, aſſerts, that there are public ſhops at Naples where this cruel operation is performed, and that over the door of theſe ſhops is inſcribed *Qui ſi caſtrano ragazzi*. But Dr Burney informs us, that he was not only utterly unable to ſee or hear of any ſuch ſhops during his reſidence in that city, but was conſtantly told, both by the natives and Engliſh ſettled there, that the laws againſt ſuch a practice were ſo numerous and ſevere, that it was never performed but with the utmoſt ſecrecy.

In the eaſtern parts of the world, they make eunuchs in order to be guards or attendants on their women. The ſeraglio of the eaſtern emperors are chiefly ſerved and guarded by eunuchs; and yet, from good authority, we learn, that the rich eunuchs in Perſia and other countries keep ſeraglios for their own uſe. Thoſe who, out of an imprudent zeal to guard themſelves from ſenſual pleaſures, made themſelves eunuchs, were, by the council of Nice, condemned and excluded from holy orders. There are ſeveral ſevere prohibitions in Germany againſt the making of eunuchs; and in France an eunuch muſt not marry, not even with the conſent of the woman.

Though the practice of caſtration is deteſtable in every point of view; yet there appears no real foundation for the injurious opinion generally entertained of eunuchs, viz. that they are all cowards, and devoid of genius for literature or any ſolid ſtudy. "As to genius (ſays the author laſt quoted), I never found thoſe of the firſt claſs in muſic deficient in intellectual abilities for more ſerious ſtudies. Indeed I have ſeen real genius and diſpoſition for literary purſuits, in more than one great opera ſinger; and as for compoſition, and the theory of muſic, not only the beſt ſingers of the Pope's chapel ever ſince the beginning of the laſt century, but the beſt compoſers, are among the ſoprani, in that ſervice." With reſpect to the operation affecting the mind ſo much as to deprive it of all fortitude in times of danger, there is great reaſon to doubt the fact: moſt of the generals of eaſtern monarchs having been at all times of this claſs; and the braveſt ſtand that ever was made againſt Alexander the Great was at Gaza, under the command of one of Darius's generals, who was a eunuch. Ammianus Marcellinus gives an account of Menophilus, a eunuch, to whom Mithridates intruſted his daughter; which proves the poſſibility of ſuch unfortunate perſons poſſeſſing a heroiſm equal to that of the moſt determined Stoic.

It is very certain, that the ancients never ſuppoſed eunuchs to have been men of inferior intellects, or that they poſſeſſed leſs vigour of mind than other men. At leaſt the Perſians were not of this opinion; for Herodotus* relates, that when they had taken poſſeſſion of ſome Ionian cities, παιδας τε τȣς ευ ειδεστατȣς εκλεγομενοι εξεταμνον, και εποιευν αντι ειναι ενορχιας ευνȣχȣς. It is certain, however, Herodotus †, in relating the melancholy ſtory of Hermotimus, ſays, that παρα τοισι βαρβαροισι τι μεωτεροι εισι ει ευνȣχοι, πιστιος εινεκα πασης, των ενορχιων. "among the barbarians, the eunuchs are more valued than other men on account of their univerſal fidelity." It appears from this paſſage of Herodotus, that in Perſia eunuchs were far from being objects of contempt; and were even frequently promoted to the higheſt honours. This was indeed the caſe with Hermotimus. We find in Agathias, who was one of the Byzantine hiſtorians, that a general in the Roman army, named *Narſes*, was a eunuch. This was in the latter ages. In Plutarch's Life of Ariſtides, Themiſtocles is related to have choſen an eunuch, whoſe name was *Arnaces*, from among his priſoners, to ſend on a ſecret embaſſy to Xerxes. This ſurely may ſerve to ſhow, that mental imbecility was not ſuppoſed by the Greeks to be the characteriſtic of eunuchiſm. The ſame ſtory of the confidence placed in Arnaces, who was one of the Perſian king's eunuchs, is related alſo in the life of Themiſtocles. Ariſtotle paid ſuch high reſpect to Hermias, who was a eunuch and governor of Atarnea, which is in Myſia, that he even offered ſacrifices in honour of him: as Lucian informs us in his Dialogue entitled *Eunuchus*. This regard of Ariſtotle for Hermias has been often celebrated, and is mentioned by Suidas, Harpocratio, and others.

EUNUCHS, in church-hiſtory, a ſect of heretics in the third century, who were mad enough to caſtrate, not only thoſe of their own perſuaſion, but even all others they could lay hold of. They took their riſe from the example of Origen, who, miſunderſtanding the following words of our Saviour, "and eunuchs who made

* Lib. vi. 32 p. 451. ed. Weſſeling.

† Lib vi. p. 668.

themſelves eunuchs for the kingdom of heaven," caſtrated himſelf.

EVOCATI, ſoldiers among the Romans, who having ſerved their full time in the army, went afterwards volunteers at the requeſt of ſome favourite general; on which account they were called by the honourable names of *Emeriti* and *Beneficiarii*.

EVOCATION (*Evocatio*,) among the Romans, a religious ceremony always obſerved by them at the undertaking a ſiege, wherein they ſolemnly called upon the gods and goddeſſes of the place to forſake it and come over to them. Without the performance of this ceremony, they either thought that the place could not be taken, or that it would be a ſacrilege to take the gods priſoners. They always took it for granted that their prayer was heard, and that the gods had deſerted the place and come over to them, provided they were able to make themſelves maſters of it.

EUODIA, in botany: A genus of the monogynia order, belonging to the tetrandria claſs of plants. The calyx is a tetraphyllous perianthium; the corolla conſiſts of four ſpathulated, ſharp, and open petals; the ſtamina are four ſubulated filaments as long as the petals; the pericarpium four, roundiſh, bivalve, and monoſpermous capſules; the ſeeds ſolitary.

EVOLUTION, in algebra, the unfolding or opening of a curve, and making it deſcribe an evolvent. The world *evolutio* is formed of the prepoſition *e* "out;" and *volvo* "I roll, or wind;" q. d. an *unwinding*, or *unrolling*.

The equable evolution of the periphery of a circle, or other curve, is ſuch a gradual approach of the circumference to rectitude, as that its parts do all concur and equally evolve or unbend; ſo that the ſame line becomes ſucceſſively a leſs arc of a reciprocally greater circle; till at laſt they change into a ſtraight line. In the Philoſophical Tranſactions, Nº 260. a new quadratrix to the circle is found by this means, being the curve deſcribed by the equable evolution of its periphery.

EVOLUTION, is alſo uſed for the extraction of roots out of powers; in which ſenſe it ſtands oppoſed to involution. See ALGEBRA, p. 413.

EVOLUTION, in the art of war, the motion made by a body of troops, when they are obliged to change their form and diſpoſition, in order to preſerve a poſt or occupy another, to attack an enemy with more advantage, or to be in a condition of defending themſelves the better.

It conſiſts in doublings, counter-marches, converſions, &c. A battalion doubles the ranks, when attacked in front or rear, to prevent its being flanked or ſurrounded; for then a battalion fights with a larger front. The files are doubled, either to accommodate themſelves to the neceſſity of a narrow ground, or to reſiſt an enemy that attacks them in flank. But if the ground will allow it, converſion is much preferable; becauſe, after converſion, the battalion is in its firſt form, and oppoſes the file-leaders, which are generally the beſt men, to the enemy; and likewiſe, becauſe doubling the files in a new or not well diſciplined regiment, they may happen to fall into diſorder. See DOUBLING.

EVOLVULUS, in botany: A genus of the tetragynia order, belonging to the pentandria claſs of plants; and in the natural method ranking under the 29th order *Campanaceæ*. The calyx is pentaphyllous; the corolla quinquefid and verticillated; the capſule trilocular; the ſeeds ſolitary.

EUONYMUS, the SPINDLE-TREE: A genus of the monogynia order, belonging to the pentandria claſs of plants; and in the natural method ranking under the 43d order, *Dumoſæ*. The corolla is pentapetalous; the capſule pentagonal, quinquelocular, quinquevalved, and coloured; the ſeeds hooded. There are two ſpecies, 1. The europæus, hath an upright woody ſtem 10 or 15 feet high, garniſhed with oblong oppoſite leaves: from the ſides of the branches proceed ſmall bunches of greeniſh quadrifid flowers, ſucceeded by pentagonous capſules, diſcloſing their ſeeds in a beautiful manner in autumn. 2. The americanus, or evergreen ſpindle-tree, hath a ſhrubby ſtem, dividing into many oppoſite branches, riſing ſix or eight feet high, garniſhed with ſpear-ſhaped evergreen leaves growing oppoſite, and from the ſides and ends of the branches. The flowers are quinquefid and whitiſh, and come out in ſmall bunches, ſucceeded by roundiſh, rough, and protuberant capſules, which rarely perfect their ſeeds in Britain. Both theſe ſpecies are hardy, and will ſucceed in any ſoil or ſituation. The berries of the firſt ſort vomit and purge very violently, and are fatal to ſheep. If powdered and ſprinkled upon hair, they deſtroy lice. If the wood is cut when the plant is in bloſſom, it is tough and not eaſily broken; and in that ſtate it is uſed by watchmakers for cleaning watches, and for making ſkewers and tooth-pickers. Cows, goats, and ſheep, eat this plant; horſes refuſe it.

EUPATORIUM, HEMP-AGRIMONY: A genus of the polygamia æqualis order, belonging to the syngeneſia claſs of plants; and in the natural method ranking under the 49th order, *Compoſitæ*. The receptacle is naked; the pappus feathery; the calyx imbricated and oblong; the ſtyle ſemibifid and long. There are 13 ſpecies, many of them herbaceous flowery perennials, producing annual ſtalks from two to three or five feet high, terminated by cluſters of compound flowers of a red, purple, or white, colour. They are eaſily propagated by ſeeds, or parting the roots in autumn or ſpring. One ſpecies, viz. the cannabinum, or water hemp-agrimony, is a native of Britain. It is found wild by the ſides of rivers and ditches, and has pale red bloſſoms. It has an acrid ſmell, and a very bitter taſte, with a conſiderable ſhare of pungency. The leaves are much recommended for ſtrengthening the tone of the viſcera, and as an aperient; and ſaid to have excellent effects in the dropſy, jaundice, cachexies, and ſcorbutic diſorders. Boerhaave informs us, that this is the common medicine of the turf-diggers in Holland, againſt ſcurvies, foul ulcers, and ſwellings in the feet, to which they are ſubject. The root of this plant is ſaid to operate as a ſtrong cathartic: but it is hardly uſed in Britain, and has no place in our pharmacopœias.

EUPATRIDÆ, in antiquity, a name given by Theſeus to the nobility of Athens, as diſtinguiſhed from the Geomori and Demiurgi, The Eupatridæ, by Theſeus's eſtabliſhment, had the right of chooſing magiſtrates, teaching and diſpenſing the laws, and interpreting holy and religious myſteries. The whole city, in all other matters, was reduced to an equality. The Geomori were huſbandmen, and inferior to the Eupatridæ, *Euphorbia.* Plate CLXXXVII.

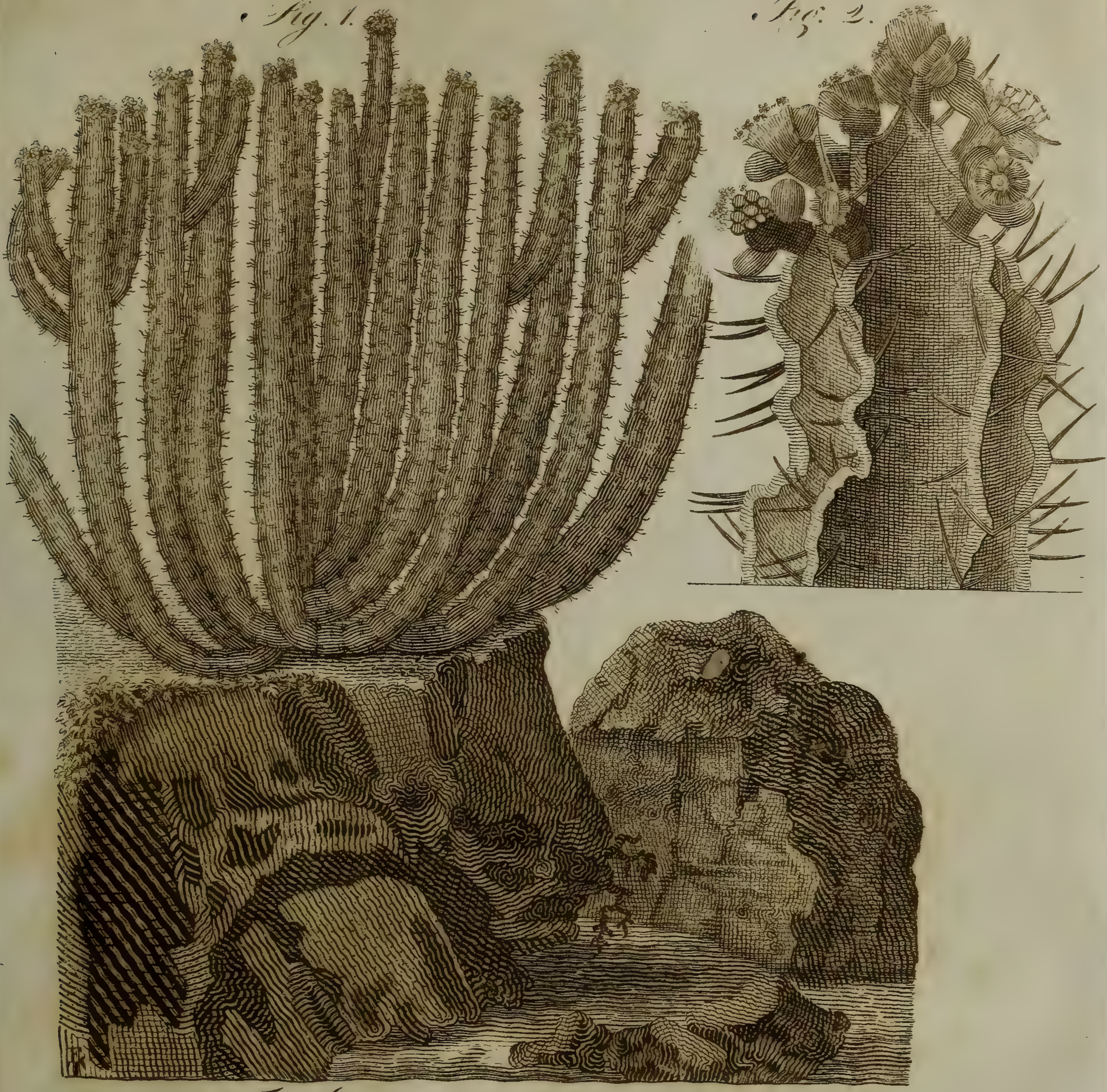
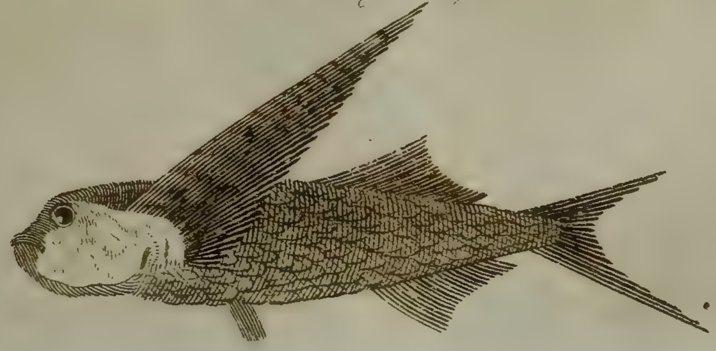


Fig. 1. *Fig. 2.*

Fig. 3. Exocœtus, the Flying Fish.



Fenchard sculp.

tridæ in point of fortune ; the Demiurgi were artificers, and fell ſhort of the Eupatridæ in number.

EUPHONY, in grammar, an eaſineſs, ſmoothneſs, and elegancy of pronunciation. The word is formed of ευ, *bene*, "well," and φωνη, *vox* "voice." Quintilian calls *euphonia*, "*vocalitas* ;" Scaglier, "*facilis pronunciatio.*"

Euphonia is properly a kind of figure whereby we ſuppreſs a too harſh letter, or convert it into a ſmoother, contrary to the ordinary rules. There are examples enough in all languages.

EUPHYMISM. See ORATORY.

EUPHORBIA, SPURGE: A genus of the trigynia order, belonging to the dodecandria claſs of plants ; and in the natural method ranking under the 38th order, *Tricoccæ*. The corolla is tetrapetalous or pentapetalous, placed on the calyx ; the calyx is monophyllous and ventricoſe ; the capſule tricoccous. There are 62 ſpecies, ſix of which are natives of Great Britain. They are moſtly ſhrubby and herbaceous ſucculents, frequently armed with thorns, having ſtalks from 10 or 12 inches to as many feet in height, with quadripetalous flowers of a whitiſh or yellow colour. They are eaſily propagated by cuttings ; but the foreign kinds muſt be always kept in pots in a ſtove. If kept dry, they may be preſerved for ſeveral months out of the ground, and then planted, when they will as readily take root as though they had been freſh. The juice of all the ſpecies is ſo acrid, that it corrodes and ulcerates the body wherever it is applied ; ſo that phyſicians have ſeldom ventured to preſcribe it internally. Warts, or corns, anointed with the juice, preſently diſappear. A drop of it put into the hollow of an aching tooth, gives relief, like other corroſives, by deſtroying the nerve. Some people rub it behind the ears, that it may bliſter. One of the foreign ſpecies, named *eſula*, is ſuch a violent corroſive, that, if applied to any part of the body, it produces a violent inflammation, which is ſoon ſucceeded by a ſwelling that degenerates into a gangrene and proves mortal. There is a ſpecies at the Cape, which ſupplies the Hottentots with an ingredient for poiſoning their arrows. Their method of making this pernicious mixture, is by firſt taking the juice extracted from the Euphorbia, and a kind of caterpillar peculiar to another plant which has much the appearance of a ſpecies of rhus. They mix the animal and vegetable matter ; and after drying it, they point their arrows with this compoſition, which is ſuppoſed to be the moſt effectual poiſon of the whole country. The euphorbia itſelf is alſo uſed for this purpoſe, by throwing the branches into fountains of water frequented by wild beaſts, which after drinking the water thus poiſoned, ſeldom get 1000 yards from the brink of the fountain before they fall down and expire. This plant grows from about 15 to 20 feet in height, ſending out many branches full of ſtrong ſpines. The natives cut off as many of the branches as they think neceſſary for the deſtruction of the animals they intend to poiſon. They generally conduct the water a few yards from the ſpring into a pit made for the purpoſe : after which they put in the euphorbia, and cover the ſpring, ſo that the creatures have no choice. No animal eſcapes which drinks of ſuch water, though the fleſh is not injured by the poiſon.

See Plate CLXXXVII. fig. 1.—Fig. 2. repreſent part of the ſtem and flowers magnified.

Patterſon's Journey to the Cape, p. 62.

EUPHORBIUM, in the materia medica, a gummi-reſinous ſubſtance, which exſudes from a large oriental tree, (EUPHORBIA *officinarum*). It is brought to us immediately from Barbary, in drops of an irregular form ; ſome of which, upon being broken, are found to contain little thorns, ſmall twigs, flowers, and other vegetable matters ; others are hollow, without any thing in their cavity : the tears in general are of a pale yellow colour externally, ſomewhat white withinſide : they eaſily break between the fingers. Lightly applied to the tongue, they effect it with a very ſharp biting taſte ; and upon being held for ſome time in the mouth, prove vehemently acrimonious, inflaming and exulcerating the fauces, &c. Euphorbium is extremely troubleſome to pulveriſe ; the finer part of the powder, which flies off, affecting the head in a violent manner. The acrimony of this ſubſtance is ſo great as to render it abſolutely unfit for any internal uſe : ſeveral correctors have been contrived to abate its virulence ; but the beſt of them are not to be truſted to : and as there ſeems to be no real occaſion for it, unleſs for ſome external purpoſes, we think, with Hoffman and others, that it ought to be expunged from the catalogue of internal medicines. And accordingly it has now no place in the London or Edinburgh pharmacopœias. But it is ſtill retained in moſt of the foreign ones, and is ſometimes uſed as a ſternutatory.

EUPHORBUS, a famous Trojan, ſon of Panthöus. He was the firſt who wounded Patroclus, whom Hector killed. He periſhed by the hand of Menelaus, who hung his ſhield in the temple of Juno at Argos. Pythagoras, the founder of the doctrine of the metempſychoſis or tranſmigration of ſouls, affirmed that he had been once Euphorbus, and that his ſoul recollected many exploits which had been done while it animated that Trojan's body. As a further proof of his aſſertion, he ſhowed at firſt ſight the ſhield of Euphorbus in the temple of Juno.

EUPHORION *of* CHALCIS, a poet and hiſtorian, born in the 126th Olympiad. Suetonius ſays that Tiberius compoſed verſes in imitation of Euphorion, Rianius, and Parthenius ; with whom he was charmed to ſuch a degree, that he ordered their writings and their pictures to be kept in all the public libraries, among the ancient and celebrated authors.

EUPHRASIA, EYE-BRIGHT: A genus of the angioſpermia order, belonging to the didynamia claſs of plants ; and in the natural method ranking under the 40th order, *Perſonatæ*. The calyx is quadrifid and cylindrical ; the capſule bilocular, ovato-oblong ; the ſhorter two antheræ, with the baſe of the one lobe terminated by a ſmall ſpine. There are ſeven ſpecies ; two of which, viz. the officinalis and odontites, are natives of Britain. The firſt of theſe, which hath blue flowers, is a weak aſtringent, and was formerly much celebrated in diſorders of the eyes ; but the preſent practice hath not only diſregarded its internal, but alſo its external, uſe. This plant will not grow but when ſurrounded by others taller than itſelf. Cows, horſes, goats, and ſheep, eat it ; ſwine refuſe it.

EUPHRATES, a river univerſally allowed to take its riſe in Armenia Major ; but in what particular ſpot, or in what direction it afterwards ſhapes its courſe, there is the greateſt diſagreement. Strabo ſays, that the Euphrates riſes in mount Abus, which he joins with, or accounts a part of, mount Taurus; that its beginning is on the north ſide of mount Taurus; and that running, firſt weſtward through Armenia, then ſtriking off to the ſouth, it forces its way through that mountain: and thus it riſes in the ſouth of Armenia, mount Taurus being the boundary on that ſide; and runs through its ſouth part, quite to Cappadocia, conterminal with Armenia Minor; or quite to this laſt, or to its ſouth limit; to reach which, it muſt bend its weſt courſe a little north; becauſe the Taurus, from which it roſe, lies lower, or more to the ſouth, and almoſt parallel with Melitene: and that then it turns to the ſouth, in order to break through the Taurus, and eſcape to Syria, and then take a new bend to Babylonia. To this account of Strabo, Pliny runs quite counter; adducing eye-witneſſes, who carry the Euphrates from north to ſouth in a right line, till it meets mount Taurus; placing the ſprings together with mount Abus, or Aba, which inclines to the weſt, to the north of Taurus. Ptolemy ſtrikes a middle courſe between both, placing ſprings to the eaſt, as Strabo does; whence, he ſays, it runs in a long courſe weſtward, before it bends ſouth; and that it riſes not from mount Taurus, but far to the north of it; and he makes it run ſtraight weſt from its riſe, then turn ſouth ſpontaneouſly, without any interpoſing obſtacle, in a manner quite different from Strabo, Mela, and others, who make the Taurus the cauſe of this turn. The Euphrates naturally divides into two channels, one through Babylon, and the other through Seleucia, beſides the ſeveral artificial cuts made between it and the Tigris about Babylon: and theſe cuts or trenches are what the Pſalmiſt calls the rivers of Babylon, on the willows of which the captives hung their harps. It is probable, that the Euphrates naturally poured into the ſea at one particular mouth, before theſe cuts were made. A thing appearing ſo evident to the ancients, that Pliny has ſet down the diſtance between the mouths of the Euphrates and the Tigris; and he ſays, ſome made it 25, and others 7, miles; but that the Euphrates being for a long time back intercepted in its courſe by cuts, made for watering the fields, only the branch called the *Paſitigris* fell into the ſea, the reſt of it into the Tigris, and both together into the Perſian Gulf. Overflowing the country through which it runs, at ſtated times of the year, like the Nile, it renders it fertile.

EUPOLIS, an Anthenian comic poet, flouriſhed about the 85th Olympiad. He took the freedom of the ancient comedy in laſhing the vices of the people. He loſt his life in a ſea-fight between the Athenians and Lacedemonians; and his fate was ſo much lamented, that after his death it was enacted that no poet ſhould ſerve in the wars. Some ſay Alcibiades put him to death for his ſatirical freedom.

EVREMOND (Charles de St. Denis), born at St. Denis le Guaſt in Lower Normandy in 1613, was deſigned for the gown, and entered on the ſtudy of the law; but he ſoon quitted that, and was made an enſign before he was 16. A military life did not hinder him from cultivating polite literature; and he ſignalized himſelf by his politeneſs and wit as much as by his bravery. The king made him a mareſchal de camp, and gave him a penſion of 3000 livres per annum. He ſerved under the duke of Candale in the war of Guienne; and in Flanders, till the ſuſpenſion of arms was agreed on between France and Spain: he afterwards accompanied cardinal Mazarine when he went to conclude the peace with Don Lewis de Haro, the king of Spain's firſt miniſter. He wrote, as he had promiſed, a long letter to the marquis de Crequi, of this negociation; in which he ſhowed, that the cardinal had ſacrificed the honour of France to his own private intereſt, and rallied him in a very ſatirical manner. This letter falling into the hands of the cardinal's creatures ſome time after his death, was repreſented as a ſtate-crime, and he was obliged to fly to Holland. He had too many friends in England (whither he had taken a tour the year before with the count de Soiſſons, ſent to compliment Charles II. upon his reſtoration) to make any long ſtay in Holland; and therefore paſſed over into England, where he was received with great reſpect, and admitted into intimated friendſhip with ſeveral perſons of diſtinction. The king gave him a penſion of 300l. a year. He had a great deſire to return to his native country; and, after the peace of Nimeguen, wrote a letter in verſe to the king of France to aſk leave, but in vain. Upon the death of king Charles, he loſt his penſion. He did not rely much on king James; though that prince had ſhown himſelf extremely kind to him. The revolution was advantageous to him. King William, who had known him in Holland, gave him ſubſtatial marks of his favor. He died of a ſtranguary in 1703, aged 90; and was interred in Weſtminſter-abbey, where a monument is erected to his memory. His behaviour was engaging, his humour cheerful, and he had a ſtrong diſpoſition to ſatire; he profeſſed the Romiſh religion, in which he was born; but at the bottom was certainly a freethinker. He always ſpoke of his diſgrace with the reſolution of a gentleman; and whatever ſtrong deſire he had to return to his country, he never ſolicited the favour with meanneſs: therefore, when this leave was ſignified to him unexpectedly in the decline of his life, he replied, that the infirmities of age did not permit him to leave a country where he lived agreeably. There have been many editions of his works: but the beſt is that of Amſterdam in 1726, in 5 vols 12mo, to which is prefixed his life by Doctor Des Maizeaux; who has alſo given an accurate Engliſh tranſlation of them in 3 vols 8vo.

EURIPIDES, one of the Greek poets who excelled in tragedy, was born about 468 B. C. in the iſle of Salamis, whither his father and mother had retired a little before Xerxes entered Attica. He learnt rhetoric under Prodicus, morality under Socrates, and natural philoſophy under Anaxagoras; but at 18 years of age abandoned philoſophy, in order to apply himſelf to dramatic poetry. He uſed to ſhut himſelf up in a cave to compoſe his tragedies, which were extremely applauded by the Greeks. The Athenian army, commanded by Nicias, being defeated in Sicily, the ſoldiers purchaſed their lives and liberties by reciting the verſes of Euripides; ſuch eſteem and veneration had the Sicilians for the pieces wrote by this excellent poet. Socrates, the wiſeſt of the philoſophers, ſet ſuch a value upon them, that they were the only tragedies he went to ſee acted; and yet his performances ſeldom gained the prize. Euripides frequently

Euripus, Euroclydon.

ly interſperſes through them moral ſentences, and ſevere reflections on the fair ſex ; whence he was called the *Woman-hater*. He was, nevertheleſs, married : but the ſcandalous lives of his two wives drew upon him the raillery of Ariſtophanes, and other comic poets ; which occaſioned his retiring to the court of Archelaus, king of Macedon, where he was well received. That prince was fond of learned men, and drew them to him by his liberality. If we may believe Solinus, he made Euripides his miniſter of ſtate, and gave him other extraordinary proofs of his eſteem. He had, however, paſſed but a few years there, when an unhappy accident put an end to his life. He was walking in a wood, and, according to his uſual manner, in deep meditation ; when, unfortunately happening upon Archelaus's hounds, he was by them torn in pieces. It is not certain whether his death happened by chance, or through envy of ſome of the great courtiers. However, Archelaus buried him with great magnificence ; and the Athenians were ſo much afflicted at his death, that the whole city went into mourning. Of 92 tragedies which he compoſed, only 19 are remaining : the moſt valuable editions of which are thoſe of Aldus, in 1503, 8vo ; of Plantin, in 1570, ſexeſimo ; of Commelin, in 1597, 8vo ; of Paul Stevens, in 1604, 4to ; and of Joſhua Barnes, in 1764, folio.

EURIPUS, now the NEGROPONT, a canal or ſtrait which divides the iſland of Eubœa from the continent of Greece. In one place it is ſo narrow, that a galley can ſcarce paſs through it. The agitations of the Euripus were much ſpoken of by the ancients. Some ſay that the canal has a flux and reflux ſix times in 24 hours; others, that it ebbs and flows ſeven times a day ; but Livy does not allow this flux and reflux to be ſo regular. Father Babin, a Jeſuit of great learning, who made many obſervations on the ſpot during his long abode in the iſland of Negropont, tells us, that the Euripus is regular in its ebbing and flowing the firſt eight days of the moon : the ſame regularity he obſerved from the 14th to the 20th day incluſive, and in the three laſt days : but in the other days of the lunar month, it is not ſo regular ; for it ſometimes ebbs and flows 11, 12, 13, and 14 times in the ſpace of a natural day. In this place, as the ſtory commonly goes, Ariſtotle drowned himſelf out of chagrin, for not being able to account for ſo unuſual a motion.

EURIPUS has ſince become a general name for all ſtraits, where the water is in great motion and agitation.

The ancient circuſes had their Euripi, which were no other than pits or ditches on each ſide of the courſe, into which it was very dangerous falling with their horſes and chariots as they ran races. The term *euripus* was more particularly applied by the Romans to three canals or ditches which encompaſſed the circus on three ſides, and which were filled occaſionally to repreſent naumachiæ or ſea-battles. The ſame people called their ſmaller fountains or canals in their gardens *euripuſes* ; and their largeſt, as caſcades, &c. *niles*.

EUROCLYDON, (of Ευρος *eaſt-wind*, and κλυδων *wave*,) is a ſpecies of wind, of which we have an account only in Acts xvii. 14. and concerning the nature of which critics have been much divided. Bochart, Grotius, Bentley, and others, ſubſtitute another reading, ſupported by the Alexandrian MS. and the vulgate, viz. Ευρακυλων, or *Euro-aquillo* ; but Mr Bryant defends the common reading, and conſiders the *Euroclydon*, i. e. Ευρος κλυζων, as an eaſt wind that cauſes a deep ſea or vaſt inundation. He maintains, in oppoſition to Dr Bentley's reaſoning, who ſuppoſes that the mariners in the ſhip, the voyage of which is recited in this paſſage, were Romans, that they were Greeks of Alexandria, and that the ſhip was an Alexandrian ſhip employed in the traffic of carrying corn to Italy ; and therefore, that the mariners had a name in their own language for the particular typhonic or ſtormy wind here mentioned. He alſo ſhews from the paſſage itſelf, that the tempeſtuous wind called *Euroclydon*, beat (κατ' αυτης) upon the iſland of Crete ; and therefore, as this is a relative expreſſion, referring to the ſituation of the perſon who ſpeaks of it, who was at that time to the windward or ſouth of it, the wind blew upon ſhore, and muſt have come from the ſouth or ſouth-eaſt ; which, he adds is fully warranted by the point where the ſhip was, and the direction it ran in afterwards, which was towards the north and north-weſt.

Europa, Europe.

EUROPA, in fab. hiſt. a daughter of Agenor king of Phenicia and Telephaſſa. She was ſo beautiful that Jupiter became enamoured of her, and the better to ſeduce her, he aſſumed the ſhape of a bull and mingled with the herds of Agenor, while Europa, with her female attendants were gathering flowers in the meadows. Europa careſſed the beautiful animal ; and at laſt had the courage to ſit upon his back. The god took advantage of her ſituation ; and with precipitate ſteps retired towards the ſhore, croſſed the ſea with Europa on his back, and arrived ſafe in Crete. Here he aſſumed his original ſhape, and declared his love. The nymph conſented, though ſhe had once made vows of perpetual celibacy ; and ſhe become mother of Minos, Sarpedon, and Rhadamanthus. After this diſtinguiſhed amour with Jupiter, ſhe married Aſterius king of Crete. This monarch ſeeing himſelf without children by Europa, adopted the fruit of her amours with Jupiter, and always eſteemed Minos, Sarpedon, and Rhadamanthus as his own children. Some ſuppoſe that Europa lived about 1552 years before the chriſtian era.

EUROPE, one of the quarters of the world, bounded on the north by the Frozen Ocean; on the weſt by the Weſtern Ocean, on the ſouth by the Mediterranean, which ſeparates it from Africa, and by the Archipelago, which divides it in part from Aſia, as alſo by the Black Sea, then by the river Don, till it comes near the river Volga or Wolga, and then it is parted from Aſia by this laſt, and afterwards by the river Oby. Europe is ſituated between Long. 9. 35. W. and 72. 25. E. and Lat. 35° and 72° N. It is about 3390 miles in length, from Cape St Vincent in Portugal, to the river Oby in Ruſſia ; and 2200 miles in breadth, from Cape Matapan, in the Morea, to the North Cape of Norway. We may judge by this, that it is much leſs than Aſia and Africa : but it is in many things more conſiderable than both.

Europe, excepting a ſmall part of Lapland and Muſcovy, is ſituated in the temperate zone; inſomuch, that we neither feel the extremities of heat nor cold. We cannot boaſt of rich mines of gold, ſilver, and precious ſtones ; nor does it produce ſugar or ſpices, nor yet elephants, camels, &c. which we can do without; but produces abundance of corn, pulſe, fruits, animals, &c. the moſt neceſſary for the uſe of mankind. In general, it is better peopled and better cultivated than the other quarters; it is more full of cities, towns and villages, great and ſmall, and its buildings are more ſolid and more commodious than thoſe of Africa and Aſia. The inhabitants are all white; and incomparably more handſome than the Africans, and even than moſt of the Aſiatics. The Europeans ſurpaſs both in arts and ſciences, eſpecially in thoſe called the *liberal;* in trade, navigation, and in military and civil affairs; being, at the ſame time more prudent, more valiant, more generous, more polite, and more ſociable than they: and though we are divided into various ſects, yet as Chriſtians, we have infinitely the advantage over the reſt of mankind. There are but few places in Europe where they ſell each other for ſlaves; and none where robbery is a profeſſion, as it is in Aſia and Africa.

There are ſeveral ſorts of governments in Europe; as the two empires of Germany and Ruſſia, the kingdoms of England, France, Spain, Portugal, Denmark, Sweden, Poland, Pruſſia, Sardinia, and the Two Sicilies. The commonwealths are Holland, Swiſſerland, Venice, Genoa, Raguſa, Lucca, and Geneva. The dukedoms, Tuſcany, Savoy, Modena, Mantua, Parma, and Courland, &c.

There are five ſorts of religions in Europe, viz. the Mahommedan, which is profeſſed in Turkey in Europe; the Greek, of which there are many in the ſame parts in all Muſcovy, and in ſeveral parts of Poliſh Ruſſia; the Roman Catholic in Spain, Portugal, France, and Italy; the Proteſtant, though with a conſiderable difference, in Great Britain, Denmark Sweden, and Norway. There is a mixture of both the laſt, in Ireland, Swiſſerland, Germany, Poland, Hungary, and the Low Countries: beſides many Jews, and ſome idolaters in Lapland and the northern parts of Muſcovy.

There are three general languages in Europe; the Latin, of which the Italian, the French, and the Spaniſh, are dialects; the Teutonic, which is ſpoken, tho' differently, in Germany, Hungary, Denmark, Sweden, and Great Britain; the Sclavonic, which is ſpoken, tho' greatly diſguiſed, in Muſcovy, Poland, Bohemia and Turkey in Europe. There are ſome of leſs extent: as, the Greek; the proper Hungarian; the Baſque; the Britiſh, which is ſpoken in Wales and Bretagne in France; the Iriſh; and the Laponic;

Europe may be divided into 11 great parts, including their dependencies: 1. Sweden; 2. Denmark and Norway; 3. Ruſſia; 4. Poland; 5. Germany; 6. France; 7. Spain; 8. Italy; 9. Turkey in Europe; 10. Little Tartary; and, 11. The European iſlands, of which the chief are Great Britain and Ireland. The greateſt cities in Europe are, London, Paris, Amſterdam, Conſtantinople, Muſcow, and Rome.

EURYALE, in mythology, one of the Gorgons, daughter of Phorcys, and ſiſter of Meduſa: ſhe was ſubject neither to old age nor death.

EURYANDRA, in botany; a genus of the trigynia order, belonging to the polyandria claſs of plants. The calyx is a pentaphyllous perianthium, with ſmall, roundiſh and concave leaves; the corolla conſiſts of three roundiſh hollow petals, longer than the calyx. The ſtamina are very many capillary filaments much dilated at the apex; the pericarpium three egg-ſhaped follicles containing ſeveral ſeeds.

EURYDICE, in fab. hiſt. the wife of Orpheus, who, flying from Ariſtæus that endeavoured to raviſh her, was ſlain by a ſerpent. Her huſband went down to the ſhades, and by the force of his muſic perſuaded Pluto and Proſerpine to give him leave to carry back his wife; which they granted, provided he did not look on her till he came to the light; but he breaking the condition, was forced to leave her behind him. See ORPHEUS.

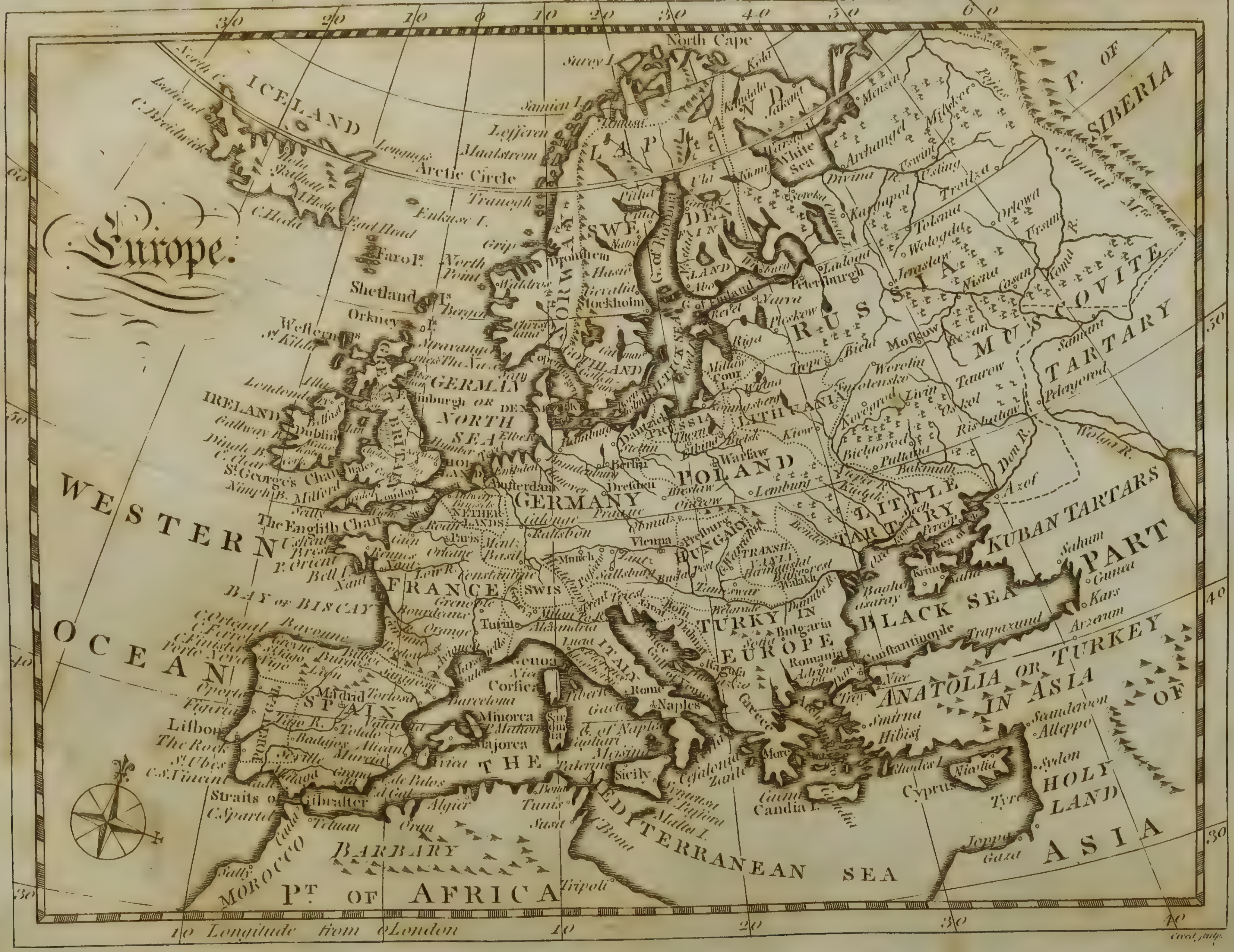
EURYMEDON, (anc. geog.) a noble river running through the middle of Pamphylia; famous for a ſea and land fight on the ſame day, in which the Athenians, under Cimon the ſon of Miltiades, defeated the Perſians. The ſea-fight happened firſt in the ſea of Pamphylia, towards Cyprus; the land engagement, the following night on the Eurymedon. Cimon, after defeating the Perſian fleet armed his men with the armour of the captives, and ſet ſail for the enemy, who lay on the banks of the Eurymedon, in the ſhips taken from the Perſians; who on ſeeing their own ſhips and their own people in appearance, were off their guard, and thus became an eaſy conqueſt.

EURYSTHEUS, a king of Argos and Mycenæ, ſon of Sthenelus, and Nicippi the daughter of Pelops. Juno haſtened his birth by two months, that he might come into the world before Hercules the ſon of Alcmena, as the younger of the two was doomed by order of Jupiter to be ſubſervient to the will of the other. (*Vide* ALCMENA.) This natural right was cruelly exerciſed by Euryſtheus, who was jealous of the fame of Hercules; and who to deſtroy ſo powerful a relation, impoſed upon him the moſt dangerous and uncommon enterpriſes well known by the name of the *twelve labours of Hercules*. The ſucceſs of Hercules in atchieving thoſe perilous labours alarmed Euryſtheus in a greater degree, and he furniſhed himſelf with a brazen veſſel, where he might ſecure himſelf a ſafe retreat in caſe of danger. After the death of Hercules, Euryſtheus renewed his cruelties againſt his children, and made war againſt Ceyx king of Trachinia, becauſe he had given them ſupport, and treated them with hoſpitality. He was killed in the proſecution of this war by Hyllus the ſon of Hercules. His head was ſent to Alcmena the mother of Hercules; who, mindful of the cruelties which her ſon had ſuffered, inſulted it, and tore out the eyes with the moſt inveterate fury. Euryſtheus was ſucceeded on the throne of Argos by Atreus his nephew. The death of Euryſtheus happened about 30 years before the Trojan war.

EURYTHMY, in architecture, painting, and ſculpture, is a certain majeſty, elegance, and eaſineſs, appearing in the compoſition of divers members or parts of a body, painting, or ſculpture, and reſulting from the fine proportion of it.

EUSDEN (Laurence), an Iriſh clergyman, rector of Coneſby in Lincolnſhire, and poet laureat after the death of Mr. Rowe. His firſt patron was the eminent lord Halifax; whoſe poem, on the battle of the Boyne, he tranſlated into Latin, and dedicated to his lordſhip. He was eſteemed by the duke of Newcaſtle, who rewarded an epithalamium he wrote on his marriage with the place of poet laureat. He was the author of many

Plate CLXXXVIII.



poetical pieces, though but little known before his preferment: he died in 1730.

EUSEBIANS, a denomination given to the ſect of Arians, on account of the favour and countenance which Euſebius, biſhop of Cæſarea, ſhowed and procured for them at their firſt riſe. See ARIANS and EUSEBIUS.

EUSEBIUS, ſurnamed PAMPHILUS, a celebrated biſhop of Cæſarea in Paleſtine, and one of the moſt learned men of his time, was born in Paleſtine about the latter end of the reign of Gallienus. He was the intimate friend of Pamphilus the Martyr; and, after his death, took his name in honour to his memory. He was ordained biſhop of Cæſarea 313. He had a conſiderable ſhare in the conteſt relating to Arius; whoſe cauſe he, as well as ſeveral other biſhops of Paleſtine, defended, being perſuaded that Arius had been unjuſtly perſecuted by Alexander biſhop of Alexandria. He aſſiſted at the Council of Nice in 325; when he made a ſpeech to the emperor Conſtantine on his coming to the council, and was placed next him on his right hand. He was preſent at the council of Antioch, in which Euſtathius biſhop of that city was depoſed; but though he was choſen by the biſhop and people of Antioch to ſucceed him, he abſolutely refuſed it. In 335, he aſſiſted at the council of Tyre held againſt Athanaſius; and at the aſſembly of biſhops at Jeruſalem, at the time of the dedication of the church there. By theſe biſhops he was ſent to the emperor Conſtantine to defend what they had done againſt Athanaſius; when he pronounced the panegyric made on that emperor during the public rejoicings in the beginning of the 30th year of his reign, which was the laſt of his life. Euſebius ſurvived the emperor but a ſhort time, for he died in 338. He wrote, 1. An Eccleſiaſtical Hiſtory, of which Valetius has given a good edition in Greek and Latin; 2. The life of Conſtantine; 3. A treatiſe againſt Hierocles; 4. *Chronicon;* 5. *Preparationes Evangelicæ;* 6. *De demonſtratione Evangelica*; of which there are but 10 books extant out of 20; and ſeveral other works, ſome of which are loſt.

EUSTACHIUS (Bartholomew), phyſician and anatomiſt at Rome, flouriſhed about the year 1550. His anatomical plates were diſcovered there in 1712, and publiſhed in 1714.

EUSTATHIANS, a name given to the Catholics of Antioch in the 4th century, on occaſion of their refuſal to acknowledge any other biſhop beſides St Euſtathius, depoſed by the Arians.

The denomination was given them during the epiſcopate of Paulinus, whom the Arians ſubſtituted to St Euſtathius, about the year 330, when they began to hold their aſſemblies apart. About the year 350, Leontius of Phrygia, called the *eunuch*, who was an Arian, and was put in the ſee of Antioch, deſired the Euſtathians to perform their ſervice in his church; which they accepting, the church of Antioch ſerved indifferently both the Arians and Catholics.

This, we are told, gave occaſion to two inſtitutions, which have ſubſiſted in the church ever ſince. The firſt was pſalmody in two choirs; though M. Baillet thinks, that if they inſtituted an alternate pſalmody between two choirs, as was between two Catholic choirs, and not by way of reſponſe to an Arian choir. The ſecond was the doxology, *Glory be to the Father, and the Son and the Holy Ghoſt.* See DOXOLOGY.

This conduct, which ſeemed to imply a kind of communion with the Arians, gave great offence to abundance of Catholics, who began to hold ſeparate meetings; and thus formed the ſchiſm of Antioch. Upon this, the reſt, who continued to meet in the church, ceaſed to be called *Euſtathians*, and that appellation became reſtrained to the diſſenting party. S. Flavianus, biſhop of Antioch in 381, and one of his ſucceſſors, Alexander, in 482, brought to paſs a coalition, or reunion, between the Euſtathians and the body of the church of Antioch, deſcribed with much ſolemnity by Theodoret, *Eccl.* l. iii. c. 2.

EUSTATHIANS were alſo a ſect of heretics in the fourth century, denominated from their founder Euſtathius, a monk ſo fooliſhly fond of his own profeſſion, that he condemned all other conditions of life. Whether this Euſtathius was the ſame with the biſhop of Sebaſtia and chief of the Semiarians, is not eaſy to determine.

He excluded married people from ſalvation; prohibited his followers from praying in their houſes; and obliged them to quit all they had, as incompatible with the hopes of heaven. He drew them out of the other aſſemblies of Chriſtians to hold ſecret ones with him, and made them wear a particular habit: he appointed them to faſt on Sundays; and taught them, that the ordinary faſts of the church were needleſs, after they had attained to a certain degree of purity which he pretended to. He ſhowed great horror for chapels built in honour of martyrs, and the aſſemblies held therein. Several women, ſeduced by his reaſons, forſook their huſbands, and abundance of ſlaves deſerted their maſters houſes. He was condemned at the council of Gangra in Paphlagonia, held between the years 326 and 341.

EUSTATHIUS, biſhop of Theſſalonica, in the 12th century, under the reigns of the emperors Emanuel, Alexander, and Andronicus Comnenus. He was a very eminent grammarian; and wrote commentaries upon Homer, and Dionyſius the geographer. The beſt edition of his Commentaries on Homer is that of Rome, printed in Greek, in 1542, in four volumes folio. His commentaries on the Periegeſis of Dionyſius were printed by Mr Hudſon at Oxford, in 1697, 8vo. Euſtathius appears to have been alive in the year 1194.

EUSTATIA, ST EUSTATIA, or *Euſtatius*, one of the Caribbee iſlands, belonging to the Dutch, and ſituated in W. Long. 62. 56. N. Lat. 17. 29. It is little elſe than a huge mountain, which formerly has, in all probability, been a volcano. Its ſituation is ſo ſtrong, that it has but one landing place; and that is fortified in ſuch a manner as to be almoſt impregnable. Tobacco is the chief product of the iſland; and it is cultivated to the very top of the pyramid, which terminates in a large plain ſurrounded with woods, but having a hollow in the middle, which ſerves as a large den for wild beaſts. No fewer than 5000 white people and 15,000 negroes ſubſiſt on this ſpot, where they rear hogs, kids, rabbits, and all kinds of poultry, in ſuch abundance, that they can ſupply their neighbours, after having ſerved themſelves.

The firſt Dutch colony ſent to this iſland conſiſted of about 1600 people. They were diſpoſſeſſed by the Engliſh from Jamaica in 1665. Soon after the Dutch and French became confederates, the Engliſh were expelled in their turn. The French continued to hold a garriſon in the iſland till the treaty of Breda, when it was reſtored to the Dutch. Soon after the revolution, the French drove out the Dutch, and were in their turn driven out by the Engliſh under Sir Timothy Thornhill, with the loſs of no more than eight men killed and wounded, though the fort they took mounted 16 guns and was in every other reſpect very ſtrong. Sir Timothy found it neceſſary for the protection of the Dutch, to leave a ſmall Engliſh garriſon in the fort; but he granted the French no terms of capitulation, except for their lives and baggage. By the peace of Ryſwic, the entire property of this iſland was reſtored to the Dutch.

This iſland was reduced by the Britiſh in the year 1781. Though not 20 miles in circumference, it abounded at that time with riches, by reaſon of the vaſt conflux of trade from every other iſland in theſe ſeas. Being a free port, it was open to all the ſubjects of the belligerent powers; and thus a communication was eſtabliſhed among them, through which they were enabled to carry on a commercial correſpondence, which greatly mitigated the inconveniences of war. The greateſt benefit, however, was reaped by the Dutch; who, by tranſacting all trading buſineſs for other nations, were thus entruſted with numberleſs commiſſions, and likewiſe enjoyed vaſt profits from the ſale of the merchandizes to which they were intitled. At the time the attack was made upon them, they were ſo little under any apprehenſions of ſuch an event, that their warehouſes were not ſufficient to contain the quantity of commercial articles imported for ſale, and the beach and ſtreets were covered with hogſheads of tobacco and ſugar. In this ſituation, Admiral Rodney having received orders to commence hoſtilities againſt the Dutch, ſuddenly appeared before the iſland with ſuch an armament of ſea and land forces, as in its defenceleſs ſituation was not only uſeleſs but ridiculous. The governor could ſcarce credit the officer who ſummoned him to ſurrender; but being convinced how matters ſtood, the only poſſible ſtep was taken, namely, to ſurrender the whole iſland, and every thing in it, at diſcretion. Along with the iſland there fell into the hands of the captors a ſhip of 60 guns, with 250 ſail of merchantmen, while the value of property on the iſland was eſtimated at no leſs than four millions ſterling. This capture became afterwards a ſubject of diſcuſſion in parliament, where the conduct of the Britiſh commanders was ſeverely ſcrutinized by Mr Burke. The admiral and general made their defence in perſon: but the minority at that time were far from being ſatisfied; and it was ſuppoſed that on the change of miniſtry a rigid inquiry would have been ſet on foot, had not the ſplendor of Admiral Rodney's victory over de Graſſe put an end to all thoughts of that nature.

The iſland of St Euſtatius is naturally of ſuch difficult acceſs, as already obſerved, that it is almoſt impoſſible for an enemy to effect a landing if proper care is taken by thoſe who are in poſſeſſion of it. This very circumſtance proved the ruin of the new poſſeſſors. The Britiſh, ſecure in their inacceſſible ſituation, conducted themſelves in ſuch a manner as induced the Marquis de Bouille to make an attempt to regain it. Having ſailed from Martinico at the head of 2000 men, he arrived, on the 26th of November 1781, off one of the landing places of the iſland, which was deemed ſo inacceſſible that it had been left without a guard. With much loſs and difficulty, however, he landed here with four or five hundred of his people during the night. The appearance of day put an end to his landing any more; and he now ſaw himſelf obliged either to relinquiſh the enterpriſe or to attack the garriſon, which was almoſt double the number of thoſe he had on the iſland. He choſe the latter; and was favoured in his enterpriſe by the extreme negligence of his antagoniſts. A difficult paſs, which a few men might have occupied with ſucceſs againſt a great number, was left unguarded, which the marquis ſecured in time, and then puſhed forward with the utmoſt expedition. The Britiſh, miſtaking a body of Iriſh troops which attended the French commander for their own comrades, ſuffered them to approach without thinking of oppoſing them. They were then exerciſing on the parade; but were ſoon made ſenſible of their fatal miſtake by a cloſe diſcharge from their ſuppoſed friends, by which many were killed and wounded. The ſurpriſe occaſioned by this ſudden attack was ſo great, that no reſiſtance could be made; eſpecially as their commanding officer, colonel Cockburn, who happened at that inſtant to come upon the parade, was made priſoner. A number of them, however, haſtened to the fort with a view of making head againſt the enemy; but the French had already taken poſſeſſion of the gate, and prevented the draw-bridge from being raiſed. They entered the fort; which, being ſurrendered by thoſe who had taken ſhelter in it, the reſt of the garriſon diſperſed in various places, and imagining the number of the enemy to be much greater than it really was, ſubmitted without any oppoſition. The French commander took this opportunity of ſhowing his diſintereſtedneſs in pecuniary matters. Among the ſpoils that fell into his hands a large ſum of money was claimed by the Britiſh commanding officer as being his private property, which was generouſly reſtored to him: in like manner the property of the Dutch inhabitants was reſerved to them, and nothing was allowed to be ſeized but the produce ariſing from the ſale of prizes that had been taken by the Britiſh when they captured the iſland.

EUSTYLE, in architecture, a ſort of building in which the pillars are placed at the moſt convenient diſtance one from another, the intercolumniations being juſt two diameters and a quarter of the column, except thoſe in the middle of the face, before and behind, which are three diameters diſtant.

EUTERPE, one of the muſes, daughter of Jupiter and Mnemoſyne. She preſided over muſic, and was looked upon as the inventreſs of the flute. She is repreſented as crowned with flowers and holding a flute in her hands: Some mythologiſts attributed to her the invention of tragedy, more commonly ſuppoſed to be the production of Melpomene.

EUTHYMIA, among the Greeks, ſignified ſuch a diſpoſition, or ſtate of the mind, as could not be ruffled either by good or bad fortune, by ſickneſs or health, good or evil.

EUTROPIUS (Flavius), a Latin author, in the 4th century, was ſecretary to Conſtantine the Great, and afterwards bore arms under the emperor Julian, and followed that prince in his expedition againſt the Perſians. He wrote an Abridgment of the Roman Hiſtory from the foundation of Rome to the reign of Valens; the beſt edition of which is that of Miſs Le Fevre, afterwards Madam Dacier, publiſhed at Paris for the uſe of the Dauphin, in 4to, in the year 1683.

EUTYCHIANS, ancient heretics, who denied the duplicity of natures in Chriſt; thus denominated from Eutyches, the archimandrite, or abbot of a monaſtery at Conſtantinople, who began to propagate his opinion A. D. 448. He did not, however, ſeem quite ſteady and conſiſtent in his ſentiments: for he appeared to allow of two natures, even before the union; which was apparently a conſequence he drew from the principles of the Platonic philoſophy, which ſuppoſes a pre-exiſtence of ſouls: accordingly he believed that the ſoul of Jeſus Chriſt had been united to the divinity before the incarnation; but then he allowed no diſtinction of natures in Jeſus Chriſt ſince his incarnation. This hereſy was firſt condemned in a ſynod held at Conſtantinople by Flavian, in 448, approved by the council of Epheſus, called *conventus latronum*, in 449, and re-examined, and fulminated in the general council of Chalcedon in 451. The legates of Pope Leo, who aſſiſted at it, maintained that it was not enough to define, that there were two natures in Jeſus Chriſt, but inſiſted ſtrenuouſly, that, to remove all equivocations, they muſt add theſe terms, without being changed, or confounded, or divided.

The hereſy of the Eutychians, which made a very great progreſs throughout the eaſt, at length became divided into ſeveral branches. Nicephorus makes mention of no fewer than twelve: ſome called *Schematici*, or *Apparentes*, as only attributing to Jeſus Chriſt a phantom or appearance of fleſh, and no real fleſh: others, *Theodoſians*, from Theodoſius biſhop of Alexandria: others, *Jacobites*, from one James (*Jacobus*), of Syria; which branch eſtabliſhed itſelf principally in Armenia, where it ſtill ſubſiſts. Others were called *Acephali*, *q. d.* without head; and *Severians*, from a monk called *Severus*, who ſeized on the ſee of Antioch in 1513. Theſe laſt were ſubdivided into five factions, *viz. Agnoetæ*, who attributed ſome ignorance to Jeſus Chriſt; the followers of Paul; Μελαινοι, that is, the black *Angelites*, thus called from the place where they were aſſembled; and laſtly, *Adrites and Cononites*.

EUTYCHIANS was alſo the name of another ſect, half Arian half Eunomian; which aroſe at Conſtantinople in the fourth century.

It being then a matter of mighty controverſy among the Eunomians at Conſtantinople, whether or no the Son of God knew the laſt day and hour of the world, particularly with regard to that paſſage in the goſpel of St Matthew, chap. xxiv. ver. 36. or rather that in St Mark, xiii. 32. where it is expreſſed, that the Son did not know it, but the Father only; Eutychius made no ſcruple to maintain, even in writing, that the Son did not know it; which ſentiment diſpleaſing the leaders of the Eunomian party, he ſeparated from them, and made a journey to Eunomius, who was then in exile.—That heretic acquieſced fully in Eutychius's doctrine, and admitted him to his communion. Eunomius dying ſoon after, the chief of the Eunomians at Conſtantinople refuſed to admit Eutychius; who, upon this, formed a particular ſect of ſuch as adhered to him, called *Eutychians*.

This ſame Eutychius, with one Theophronius, it was ſaid in Sozomen's time, were the occaſions of all the changes made by the Eunomians in the adminiſtration of baptiſm; which conſiſted, according to Nicephorus, in only uſing one immerſion, and not doing it in the name of the Trinity, but in memory of the death of Jeſus Chriſt. Nicephorus calls the chief of that ſect, not *Eutychius*, but *Eupſychius*, and his followers *Eunomiaupſychians*.

EUTYCHIUS patriarch of Alexandria, lived about the ninth age; and wrote annals in the Arabic language, printed at Oxford in 1658, with a Latin verſion by Mr Pocock. Seldon had printed ſomething of his before.

EUXINE or BLACK SEA, forms part of the boundary betwixt Europe and Aſia. It receives the Nieper, the Danube, and other large rivers; and extends from 8 to 40 degrees of E. Long. and from 40 to 46. N. Lat. The ancients imagined this ſea to have been originally only a lake or ſtanding pool which broke firſt into the Propontis, and then into the Egean, waſhing away by degrees the earth which firſt kept it within bounds, and formed the two channels of the Boſphorus Thracius and Helleſpont, now the Dardanelles.—It was anciently called the *Axenus*, ſuppoſed to be from Aſhkenaz the ſon of Gomer, who is ſaid to have ſettled near it. This original being forgot in length of time, the Greeks explained it by *inhoſpitable*, which the word Axenos literally ſignifies; and therefore, when they came to conſider the inhabitants of theſe coaſts as more civilized and hoſpitable, they changed the name into Euxinus, which it ſtill retains.

EWE, the Engliſh name of a female ſheep. See OVIS.

EWERY, in the Britiſh cuſtoms, an office in the king's houſhold, to which belongs the care of the table linen, of laying the cloth, and ſerving up water in ſilver ewers after dinner.

EX, a river that riſes in a barren tract of land, called Exmore, in Somerſetſhire; and after being joined by ſeveral little ſtreams, runs by Tiverton, where there is a ſtone bridge over the river. About nine miles below Tiverton, it is joined by a pretty large ſtream called the *Colombton*; and about two miles lower, by another ſtream formed by the junction of the Horton and Credy. With theſe additions it waſhes the walls of Exeter. At Topſham, above four miles below Exeter, it receives another conſiderable addition to its ſtream; two miles farther, it is joined by the Ken; and falls into the ocean at Exmouth, after a courſe of about 40 miles. Ships of great burden go up to Topſham, from whence veſſels of 150 tons are conveyed to the quay at Exeter, by means of an artificial canal. The Ex is navigable for veſſels of conſiderable burden to Topſham. The paſſage, however, at the mouth of the river, is but narrow, having rocks on the eaſt-ſide and broad ſands on the weſt; nor is the water on the bar more than ſix or ſeven feet deep at low water, but the tide riſes 14 or 15 feet, ſo that it is deep enough at highwater. When ſhips are within the bar, they may ride afloat at a place called Starcroſs, about a mile and an half from the river's mouth; but thoſe that go to Topſham lie aground on the ooze at low water.

EX OFFICIO, among lawyers, ſignifies the power a perſon has, by virtue of his office, to do certain acts without being applied to. Thus a juſtice of peace may *ex officio*, at his diſcretion, take ſurety of the peace, without complaint made by any perſon whatſoever.

There was formerly an oath *ex officio*, whereby a ſuppoſed offender was compelled in the eccleſiaſtical court to confeſs, accuſe, or clear himſelf of a crime; but this law is repealed.

Ex poſt Facto, in law, ſomething done after another: thus an eſtate granted may be good by matter *ex poſt facto*, that was not ſo at firſt, as in caſe of election.

EXACERBATION. See PAROXYSM.

EXACTION, in law, a wrong done by an officer, or a perſon in pretended authority, in taking a reward or fee that is not allowed by law.

A perſon guilty of exaction may be fined and impriſoned. It is often confounded with EXTORTION.

EXACUM, in botany: A genus of the monogynia order, belonging to the tetrandria claſs of plants; and in the natural method ranking under the 20th order, *Rotaceæ*. The calyx is tetraphyllous; the corolla quadrifid, with the tube globular; the capſule two-furrowed, bilocular, polyſpermous, and opening at the top.

EXÆRESIS, in ſurgery, the operation of the extracting or taking away ſomething that is hurtful to the human body.

EXAGGERATION, in rhetoric, a kind of hyperbole, whereby things are augmented or amplified, by ſaying more than the truth, either as to good or bad.

EXAGGERATION, in painting, a method by which the artiſt, in repreſenting things, changes them too much, or makes them too ſtrong, either in reſpect of the deſign or colouring. It differs from *caricaturing*, in that the latter perverts or gives a turn to the features of a face, &c. which they had not; whereas exaggeration only heightens or improves what they had.

EXALTATION, or ELEVATION, is chiefly uſed in a figurative ſenſe for the raiſing or advancing a perſon to ſome eccleſiaſtical dignity; and particularly to the papacy.

EXALTATION of the Croſs, is a feaſt of the Romiſh church, held on the 14th of September; in memory, as is generally ſuppoſed, of this, that the emperor Heraclius brought back the true croſs of Jeſus Chriſt on his ſhoulders, to the place on mount Calvary, from which it had been carried away 14 years before by Coſroes king of Perſia, at his taking of Jeruſalem, under the reign of the emperor Phocas. The croſs was delivered up by a treaty of peace made with Siroe, Coſroes's ſon. The inſtitution of this treaty is commonly ſaid to have been ſignalized by a miracle; in that Heraclius could not ſtir out of Jeruſalem with the croſs, while he had the imperial veſtments on enriched with gold and precious ſtones, but bore it with eaſe in a common dreſs.

But long before the empire of Heraclius, there had been a feaſt of the ſame denomination obſerved both in the Greek and Latin churches, on occaſion of what our Saviour ſaid in St John xii. 32. *And I, if I be* exalted, *or lifted up, will draw all men unto me.* And again, in ch. viii. ver. 28. *When you have* exalted, *or lifted up, the Son of Man, then ſhall ye know that I am he.*

The feaſt of the dedication of the temple built by Conſtantine was held, ſays Nicephorus, on the 14th of September, the day on which the temple had been conſecrated, in the year 335; and this feaſt was alſo called the *exaltation of the croſs*, becauſe it was a ceremony therein, for the biſhop of Jeruſalem to aſcend a high place built by Conſtantine for that purpoſe, in manner of a pulpit, called by the Greeks the *ſacred myſteries of God*, or *the holineſs of God*, and there hoiſt up the croſs, for all the people to ſee it.

EXALTATION, in phyſic, denotes the act, or operation, of elevating, purifying, ſubtilizing, or perfecting any natural body, its principles and parts; alſo the quality or diſpoſition which bodies acquire by ſuch operation. The term *exaltation* has been peculiarly affected by the chemiſts and alchemiſts, who, imagining it to have ſome extraordinary emphaſis, are employing it on every occaſion.

EXALTATION, in aſtrology, is a dignity which a planet acquires in certain ſigns or parts of the zodiac; which dignity is ſuppoſed to give it an extraordinary virtue, efficacy and influence. The oppoſite ſign, or part of the zodiac, is called the dejection of the planet. Thus the 15th degree of Cancer is the exaltation of Jupiter, according to Albumazor, becauſe it was the aſcendant of that planet at the time of the creation; that of the ſun is in the 19th degree of Aries, and its dejection in Libra; that of the moon is in Taurus, &c. Ptolemy gives the reaſon of this in his firſt book de Quadrup.

EXAMINATION, an exact or careful ſearch or inquiry in order to diſcover the truth or falſehood of a thing.

Self-EXAMINATION is a point much inſiſted on by divines, and particularly the ancient fathers, by way of preparation to repentance. St Ignatius reduces it to five points, viz. 1. A returning thanks to God for his benefits. 2. A begging of grace and light, to know and diſtinguiſh our ſins. 3. A running over all our actions, occupations, thoughts, and words, in order to learn what has been offenſive to God. 4. A begging of pardon, and conceiving a ſincere ſorrow for having diſpleaſed him. And, 5. Making a firm reſolution not to offend him any more; and taking the neceſſary precautions to preſerve ourſelves from it.

EXAMINERS, in chancery, two officers of that court, who examine, upon oath, witneſſes produced in cauſes depending there, by either the complainant or defendant, where the witneſſes live in London or near it. Sometimes parties themſelves, by particular order, are examined. In the country, above 20 miles from London on the parties joining in commiſſion, witneſſes are examined by commiſſioners, being uſually counſellors or attornies not concerned in the cauſe.

EXAMPLE, in a general ſenſe, denotes a copy or a pattern.

EXAMPLE, in a moral ſenſe, is either taken for a type, inſtance, or precedent, for our admonition, that we may be cautioned againſt the faults or crimes which others have committed, by the bad conſequences which have enſued from them; or example is taken for a pattern for our imitation or a model for us to copy after.

That examples have a peculiar power above the naked precept to diſpoſe us to the practice of virtue and holineſs, may appear, by conſidering, 1. That they moſt clearly expreſs to us the nature of our duties in their ſubjects and ſenſible effects. General precepts form abſtract ideas of virtue; but in examples, virtues are moſt viſible in all their circumſtances. 2. Precepts inſtruct us in what things are our duty; but examples aſſure us that they are poſſible. When we ſee men like ourſelves, who are united to frail fleſh, and in the ſame condition with us, to command their paſſions, to overcome the moſt glorious and glittering temptations, we are encouraged in our ſpiritual warfare. 3. Examples, by ſecret and lively incentive, urge us to imitation. We are touched in another manner by the viſible practice of good men, which reproaches our defects, and obliges us to the ſame zeal which laws, tho' wiſe and good, will not effect.

The example of our Saviour is moſt proper to form us to holineſs: it being abſolutely perfect, and accommodated to our preſent ſtate. There is no example of a mere man that is to be followed without limitation: But the example of Chriſt is abſolutely perfect; his converſation was a living law: "He was holy, harmleſs, undefiled, and ſeparate from ſinners."

EXAMPLE, in rhetoric, denotes an imperfect kind of induction or argumentation; whereby it is proved, that a thing which happened on ſome other occaſion will happen again on the preſent one, from the ſimilitude of the caſes. As, "The war of the Thebans, againſt their neighbours the Phocians, was ruinous; conſequently, that of the Athenians againſt their neighbours, will likewiſe be fatal."

EXANTHEMA, among phyſicians, denotes any kind of efflorescence or eruption, as the meaſles, purple ſpots in the plague, or malignant fevers, &c.

EXARCH, in antiquity, an appellation given, by the emperors of the eaſt, to certain officers ſent into Italy, in quality of vicars, or rather prefects, to defend that part of Italy which was yet under their obedience; particularly the city of Ravenna againſt the Lombards, who had made themſelves maſters of the greateſt part of the reſt.

The reſidence of the exarch was at Ravenna; which city, with that of Rome, were all that was left the emperors. The firſt exarch was the patrician Boetius, famous for his treatiſe, De Conſolatione Philoſophiæ; appointed in 568 by the younger Juſtin. The exarchs ſubſiſted about 185 years, and ended in Eutychius; under whoſe exarchate the city of Ravenna was taken by the Lombard king Aſtulphus, or Aſtolphus.

The emperor Frederic created Heraclius, archbiſhop of Lyons, a deſcendant of the illuſtrious houſe of Montboiſſier, exarch of the whole kingdom of Burgundy; a dignity till that time unknown any where but in Italy, particularly in the city of Ravenna.

Homer, Philo, and other ancient authors, give likewiſe the name *exarchus* to the choragus or maſter of the ſingers, in the ancient choruſes, or him who ſung firſt: the word αρχω or αρχομαι ſignifying equally *to begin*, and *to command*.

Exarch of a Dioceſe was, anciently, the ſame with primate. This dignity was inferior to the patriarchal, yet greater than the metropolitan.

EXARCH alſo denotes an officer, ſtill ſubſiſting in the Greek church; being a kind of deputy or legate *à latere* of the patriarch, whoſe office it is to viſit the provinces allotted him, in order to inform himſelf of the lives and manners of the clergy; take cognizance of eccleſiaſtical cauſes; the manner of celebrating divine ſervice; the adminiſtration of the ſacraments, particularly confeſſion; the obſervance of the canons; monaſtic diſcipline; affairs of marriages, divorces, &c. but, above all, to take an account of the ſeveral revenues which the patriarch receives from ſeveral churches; and particularly, as to what regards the collecting the ſame.

The exarch, after having greatly enriched himſelf in his poſt, frequently riſes to the patriarchate itſelf.

EXARCH is alſo uſed, in the eaſtern church antiquity, for a general or ſuperior over ſeveral monaſteries; the ſame that we otherwiſe call archimandrite; being exempted, by the patriarch of Conſtantinople, from the juriſdiction of the biſhops; as are now the generals of the Romiſh monaſtic orders.

EXAUCTORATIO, in the Roman military diſcipline, differed from the miſſio, which was a full diſcharge, and took place after they had ſerved in the army 20 years; whereas the exauctoratio was only a partial diſcharge: they loſt their pay indeed, but ſtill kept under their colours or *vexilla*, though not under the *aquila* (or eagle), which was the ſtandard of the legion: whence, inſtead of *Legionarii*, they were called *Subſignani*, and were retained till they had either ſerved their full time, or had lands aſſigned them. The exauctoratio took place after they had ſerved 17 years.

EXCALCEATION, among the Hebrews, was a particular law, whereby a widow, whom her huſband's brother refuſed to marry, had a right to ſummon him to a court of juſtice; and, upon his refuſal, might excalceate him, that is, pull off one of his ſhoes, and ſpit in his face; both of them actions of great ignominy.

EXCELLENCY, a title anciently given to kings and emperors, but now to ambaſſadors, generals, and other perſons who are not qualified for that of *highneſs*, and yet are to be elevated above the other inferior dignities.

EXCENTRIC, in geometry, a term applied to circles and ſpheres which have not the ſame centre, and conſequently are not parallel; in oppoſition to concentric, where they are parallel, having one common centre.

EXCENTRICITY, in aſtronomy, is the diſtance of the centre of the orbit of a planet from the centre of the ſun; that is the diſtance between the centre of the ellipſis and the focus thereof.

EXCEPTION, ſomething reſerved or ſet aſide, and not included in a rule.

It is become proverbial, that there is no rule without an exception; intimating that it is impoſſible to comprehend all the particular caſes, under one and the ſame maxim. But it is dangerous following the exception preferably to the rule.

EXCEPTION, in law, denotes a ſtop or ſtay to an action; and is either dilatory or peremptory, in proceedings at common law; but in chancery it is what the plaintiff alleges againſt the ſufficiency of an anſwer, &c.

An exception is no more than the denial of what is taken to be good by the other party, either in point of law or pleading. The counſel in a cauſe are to take all their exceptions to the record at one time, and before the court has delivered any opinion of it.

EXCERPT, in matters of literature. See EXTRACT.

EXCESS, in arithmetic and geometry, is the difference between any two unequal numbers or quantities, or that which is left after the leſſer is taken from or out of the greater.

EXCHANGE, in a general ſenſe, a contract or agreement, whereby one thing is given or exchanged for another.

EXCHANGE, in commerce, is the receiving or paying of money in one country for the like ſum in another, by means of bills of exchange.

The ſecurity which merchants commonly take from one another when they circulate their buſineſs, is a bill of exchange, or a note of hand: theſe are looked upon as payment. See BILL, and *Mercantile* LAWS.

The punctuality of acquitting theſe obligations is eſſential to commerce; and no ſooner is a merchant's accepted bill proteſted, than he is conſidered as a bankrupt. For this reaſon, the laws of moſt nations have given very extraordinary privileges to bills of exchange. The ſecurity of trade is eſſential to every ſociety; and were the claims of merchants to linger under the formalities of courts of law when liquidated by bills of exchange, faith, confidence, and punctuality, would quickly diſappear, and the great engine of commerce would be totally deſtroyed.

A regular bill of exchange is a mercantile contract, in which four perſons are concerned, viz. 1. The drawer, who receives the value: 2. His debtor, in a diſtant place, upon whom the bill is drawn, and who muſt accept and pay it; 3. The perſon who gives value for the bill, to whoſe order it is to be paid: and, 4. The perſon to whom it is ordered to be paid, creditor to the third.

By this operation, reciprocal debts, due in two diſtant parts, are paid by a ſort of transfer, or permutation of debtors and creditors.

(A) in London is creditor to (B) in Paris, value 100 l. (C) again in London is debtor to (D) in Paris for a like ſum. By the operation of the bill of exchange, the London creditor is paid by the London debtor; and the Paris creditor is paid by the Paris debtor; conſequently, the two debts are paid, and no money is ſent from London to Paris nor from Paris to London.

In this example, (A) is the drawer, (B) is the accepter, (C) is the purchaſer of the bill, and (D) receives the money. Two perſons here receive the money, (A) and (D); and two pay the money, (B) and (C); which is juſt what muſt be done when two debtors and two creditors clear accounts.

This is the plain principle of a bill of exchange. From which it appears, that reciprocal and equal debts only can be acquitted by them.

When it therefore happens, that the reciprocal debts of London and Paris (to uſe the ſame example) are not equal, there ariſes a balance on one ſide. Suppoſe London to owe Paris a balance, value 100 l. How can this be paid? Anſwer, It may either be done with or without the intervention of a bill.

With a bill, if an exchanger, finding a demand for a bill upon Paris for the value of 100 l. when Paris owes no more to London, ſends 100 l. to his correſpondent at Paris in coin, at the expenſe (ſuppoſe) of 1 l. and then, having become creditor on Paris, he can give a bill for the value of 100 l. upon his being repaid his expenſe, and paid for his riſk and trouble.

Or it may be paid without a bill, if the London debtor ſends the coin himſelf to his Paris creditor, without employing an exchanger.

This laſt example ſhows of what little uſe bills are in the payment of balances. As far as the debts are equal, nothing can be more uſeful than bills of exchange; but the more they are uſeful in this eaſy way of buſineſs, the leſs profit there is to any perſon to make a trade of exchange, when he is not himſelf concerned either as debtor or creditor.

When merchants have occaſion to draw and remit bills for the liquidation of their own debts, active and paſſive, in diſtant parts, they meet upon'Change; where to purſue the former example, the creditors upon Paris, when they want money for bills, look out for thoſe who are debtors to it. The debtors to Paris again, when they want bills for money, ſeek for thoſe who are creditors upon it.

This market is conſtantly attended by brokers, who relieve the merchant of the trouble of ſearching for thoſe he wants. To the broker every one communicates his wants, ſo far as he finds it prudent; and by going about among all the merchants, the broker diſcovers the ſide upon which the greater demand lies, for money or for bills.

He who is the demander in any bargain, has conſtantly the diſadvantage in dealing with him of whom he demands. This is no where ſo much the caſe as in exchange, and renders ſecrecy very eſſential to individuals among the merchants. If the London merchants want to pay their debts to Paris, when there is a balance againſt London, it is their intereſt to conceal their debts, and eſpecially the neceſſity they may be under to pay them; from the fear that thoſe who are creditors upon Paris would demand too high a price for the exchange over and above par.

On the other hand, thoſe who are creditors upon Paris, when Paris owes a balance to London, are as careful in concealing what is owing to them by Paris, from the fear that thoſe who are debtors to Paris would avail themſelves of the competition among the Paris creditors, in order to obtain bills for their money, below the value of them, when at par. A creditor upon Paris, who is greatly preſſed for money at London, will willingly abate ſomething of his debt, in order to get one who will give him money for it.

From the operation carried on among merchants upon'Change, we may diſcover the conſequence of their ſeparate and jarring intereſts. They are conſtantly intereſted in the ſtate of the balance. Thoſe who are creditors on Paris, fear the balance due to London; thoſe who are debtors to Paris, dread a balance due to Paris. The intereſt of the firſt is to diſſemble what they fear; that of the laſt, to exaggerate what they wiſh. The brokers are thoſe who determine the courſe of the day; and the moſt intelligent merchants are thoſe who diſpatch their buſineſs before the fact is known.

Now, how is trade in general intereſted in the queſtion, Who ſhall outwit, and who ſhall be outwitted, in this complicated operation of exchange among merchants?

The intereſt of trade and of the nation is principally concerned in the proper method of paying and receiving the balances. It is alſo concerned in preſerving a juſt equality of profit and loſs among all the merchants, relative to the real ſtate of the balance. Unequal competition among men engaged in the ſame purſuit, conſtantly draws along with it bad conſequences to the general undertaking; and ſecrecy in trade will be found, upon examination, to be much more uſeful to merchants in their private capacity, than to the trade they are carrying on.

Merchants endeavour to ſimplify their buſineſs as much as poſſible; and commit to brokers many operations which require no peculiar talents to execute. This of exchange is of ſuch a nature, that it is hardly poſſible for a merchant to carry on the buſineſs of his bills, without their aſſiſtance, upon many occaſions. When merchants come upon 'Change, they are ſo full of fear and jealouſies, that they will not open themſelves to one another, leſt they ſhould diſcover what they want to conceal. The broker is a confidential man, in ſome degree, between parties, and brings them together.

Beſides the merchants who circulate among themſelves their reciprocal debts and credits ariſing from their importation and exportation of goods, there is another ſet of merchants who deal in exchange; which is the importation and exportation of money and bills.

Were there never any balance on the trade of nations, exchangers and brokers would find little employment: reciprocal and equal debts would eaſily be tranſacted openly between the parties themſelves. No man feigns and diſſembles, except when he thinks he has an intereſt in ſo doing.

But when balances come to be paid, exchange becomes intricate; and merchants are ſo much employed in particular branches of buſineſs, that they are obliged to leave the liquidation of their debts to a particular ſet of men, who make it turn out to the beſt advantage to themſelves.

Whenever a balance is to be paid, that payment coſts, as we have ſeen, an additional expence to thoſe of the place who owe it, over and above the value of the debt.

If, therefore, this expence be a loſs to the trading man, he muſt either be repaid this loſs by thoſe whom he ſerves, that is, by the nation; or the trade he carries on will become leſs profitable.

Every one will agree, that the expence of high exchange upon paying a balance is a loſs to a people, no way to be compenſated by the advantages they reap from enriching the few individuals among them who gain by contriving methods to pay it off; and if an argument is neceſſary to prove this propoſition, it may be drawn from this principle, viz. whatever renders the profit upon trade precarious or uncertain, is a loſs to trade in general: this loſs is the conſequence of high exchange; and although a profit does reſult from it upon one branch of trade, the exchange-buſineſs, yet that cannot compenſate the loſs upon every other.

We may, therefore, here repeat what we have ſaid above, that the more difficulty is found in paying a balance, the greater is the loſs to a nation.

The Courſe of Exchange.

THE courſe of exchange is the current price betwixt two places, which is always fluctuating and unſettled, being ſometimes above and ſometimes below par, according to the circumſtances of trade.

When the courſe of exchange riſes above par, the country where it riſes may conclude for certain, that the balance of trade runs againſt them. The truth of this will appear, if we ſuppoſe Britain to import from any foreign place goods to the value of 100,000l. at par, and export only to the value of 80,000l. In this caſe, bills on the ſaid foreign place will be ſcarce in Britain, and conſequently will riſe in value; and after the 80,000l. is paid, bills muſt be procured from other places at a high rate to pay the remainder, ſo that perhaps 120,000l. may be paid for bills to diſcharge a debt of 100,000l.

Though the courſe of exchange be in a perpetual flux, and riſes or falls according to the circumſtances of trade; yet the exchanges of London, Holland, Hamburgh, and Venice, in a great meaſure regulate thoſe of all other places in Europe.

I. *Exchange with Holland.*

MONEY-TABLE.

		Par in Sterling.		*s.*	*d.*
8 Pennings, or 2 duytes,	make	1 groat or penny	=	0	0 54
2 Groats, or 16 pennings,		1 ſtiver	=	0	1.09
6 Stivers, or 12 pence,		1 ſchilling	=	0	6.56
20 Schillings,		1 pound Flemiſh	=	10	11.18
20 Stivers, or 40 pence,		1 gilder or florin	=	1	9.86
6 Guilders, or florins,		1 pound Flemiſh	=	10	11.18
2½ Guilders, or florins,		1 rix dollar	=	4	6.66

In Holland there are two ſorts of money, bank and current. The bank is reckoned good ſecurity; demands on the bank are readily anſwered; and hence bank money is generally rated from 3 to 6 *per cent.* better than the current. The difference between the bank and current money is called the *agio*.

Bills on Holland are always drawn in bank-money; and if accounts be ſent over from Holland to Britain in current

current money, the Britiſh merchant pays theſe accounts by bills, and in this caſe has the benefit of the agio.

Prob. I. *To reduce bank-money to current money.*

Rule. As 100 to 100+agio, ſo the given guilders to the anſwer.

Examp. What will 2210 guilders in bank-money amount to in Holland currency, the agio being $3\frac{1}{8}$ *per cent?*

```
                    Guild.
As 100 : 103⅛ :: 2210
      8     8     825
   ----  ----   -----
    800   825   11050
                4420
               17680
              ---------Guild.  ſt.  pen.
        8|00)18232|50(2279    1    4.cur.
               16...20
              ----  ----
                22  10|00(
                16   8
                --   -
                63   2
                56  16
                --  --
                72  32
                72  32
```

Or, by practice,

```
  50)2210
      44.2     = 2 per cent.
      22.1     = 1 per cent.
       7.7625  = ⅛ per cent.
    ----------
    2279.0625
```

If the agio only be required, make the agio the middle term, thus:

```
                        Guil.  ſt.  pen.
As 100 : 3⅛ : : 2210 : 69     1    4 agio.
```

Or, work by practice, as above.

Prob. II. *To reduce current money to bank-money.*

Rule. As 100+agio to 100, ſo the given guilders to the anſwer.

Example. What will 2279 guilders 1 ſtiver 4 pennings, Holland currency, amount to in bank-money, the aigo being $3\frac{1}{8}$ *per cent?*

```
    Guild.   Guild.   Guild. ſt. pen.
As 103⅛  :   100 : : 2279  1   4
       8       8       20
    -----   b-----   -----
     825     800     45581
      20                16
   ------            ------
   16500             273490
      16              45581
   ------            ------
     990             729300
    165                 800
   ------           --------
 8)264|000        8)583440|000
  3)33              3)72930 Guild.
    11             11)24310(2210 bank.
```

In Amſterdam, Rotterdam, Middleburgh, &c. books and accounts are kept by ſome in guilders ſtivers and pennings, and by others in pounds ſhillings and pence Flemiſh.

Britain gives 1l. Sterling for an uncertain number of ſhillings and pence Flemiſh. The par is 1l. Sterling for 36.59s. Flemiſh; that is 1 l. 16 s. 7.08 d. Flemiſh.

When the Flemiſh rate riſes above par; Britain gains and Holland loſes by the exchange, and *vice verſa.*

Sterling money is changed into Flemiſh, by ſaying,
As 1 l. Sterling to the given rate,
So is the given Sterling to the Flemiſh ſought.
Or, the Flemiſh money may be caſt up by practice.

Dutch money, whether pounds, ſhillings, pence Flemiſh, or guilders, ſtivers, pennings, may be changed into Sterling, by ſaying,
As the given rate to 1 l. Sterling,
So the given Dutch to the Sterling ſought.

Example. 1. A merchant in Britain draws on Amſterdam for 782 l. Sterling: How many pounds Flemiſh, and how many guilders, will that amount to, exchange at 34s. 8d. *per* pound Sterling?

```
                                 |        Decimally.
   L.  s. d.      L.             |     L.    s.       L.
If 1 : 34 8 : :  782             |  If 1  :  34.6 : : 782
          12                     |           782
        ----                     |          -----
         416                     |           693
         782                     |         27733
        ----                     |        242666
         832                     |       --------
        3328                     |   2|0)2710|9.3
       2912                      |   ------------
     --------                    |   L.1355 9 4 Flem.
  12)325312                      |
     --------d.                  |
2|0) 2710|9 4                    |
     --------                    |
  L.1355 9 4 Flem.               |
```

```
       By practice.              |        Or thus:
                |L.   s.  d.     |                |L.   s. d.
                |782             |                |782
  10s. = 1/2    |391             |  14s. = 7/10   |547  8
   4s. = 1/5    |156  8          |   8d. = 1/30   | 26  1  4
   8d. = 1/6    | 26  1  4       |                |-----------
                |-----------     |                |1355  5  4 Fl.
                |1355  9  4 Fl.  |
```

Multiply the Flemiſh pounds and ſhillings by 6, and the product will be guilders and ſtivers; and if there be any pence, multiply them by 8 for pennings; or, divide the Flemiſh pence by 40, and the quot will be guilders, and the half of the remainder, if there be any, will be ſtivers, and one penny odd will be half a ſtiver, or 8 pennings, as follows:

```
       L.  s. d.                    Flem. pence.
      1355 9 4                 4|0)32531|2(32 rem.
           6
  ----------------            ------------------
  Guild. 8132 16 ſtiv.        Guild. 8132 16 ſtiv.
```

2. Change 591 l. 5s. Flemiſh into Sterling money, exchange at 37s. 6d. Flemiſh *per* l. Sterling.

Exchange.

```
      Flem.  Ster.   Flem.
       s. d.  L.    L.   s.
  If 37 6 : 1 :: 591   5
        2              20
       ——       ————————
   5)75          11025
       ——            2
   4)15         ————————
       ——        5)23650
        3       ————————
                 5)  4730
                ————————
                 3)   946
                ————————
    L. s. d.         315⅓
Anſ. 315 5 8 Ster.
```

Decimally.

```
     5)L.   L.   5) L.
  If 1.875 : 1 :: 591.25
   ——————       ———————
  5) .275      5)118.25
  5) .075      5) 23.65
     .015   .015)  4.73(313.3
                  45
                  ——
                   23
                   15
                   ——
                    80
                    75
                    ——
                     50
                     45
                     ——
                     *5
```

Holland exchanges with other nations as follows, *viz.* with

		Flem. d.
Hamburgh, on the dollar,	=	66$\frac{2}{3}$
France, on the crown,	=	54
Spain, on the ducat,	=	109$\frac{4}{5}$
Portugal, on the cruſade,	=	50
Venice, on the ducat,	=	93
Genoa, on the pezzo,	=	100
Leghorn, on the piaſtre,	=	100
Florence, on the crown,	=	120
Naples, on the ducat	=	74$\frac{2}{3}$
Rome, on the crown,	=	136
Milan, on the ducat,	=	102
Bologna, on the dollar,	=	94$\frac{4}{9}$

Exchange between Britain and Antwerp, as alſo the Auſtrian Netherlands, is negociated the ſame way as with Holland; only the par is ſomewhat different, as will be deſcribed in article 2d, following.

II. *Exchange with Hamburgh.*

MONEY-TABLE.

			Par in Sterling,		*s.*	*d.*
12 Phennings	make		1 ſchilling-lub	=	0	1$\frac{1}{8}$
16 Schilling-lubs			1 mark	=	1	6
2 Marks			1 dollar	=	3	0
3 Marks			1 rixdollar	=	4	6
6$\frac{1}{4}$ Marks			1 ducat	=	9	4$\frac{1}{2}$

Books and accounts are kept at the bank, and by moſt people in the city, in marks, ſchilling-lubs, and phennings; but ſome keep them in pounds, ſchillings, and groots Flemiſh.

Exchange.

The agio at Hamburgh runs between 20 and 40 *per cent.* All bills are paid in bank-money.

Hamburgh exchanges with Britain by giving an uncertain number of ſchillings and groots Flemiſh for the pound Sterling. The groot or penny Flemiſh here, as alſo at Antwerp, is worth $\frac{54}{96}$ of a penny Sterling; and ſo ſomething better than in Holland, where it is only $\frac{54}{100}$d. Sterling.

		Flemiſh.
6 Phennings	make	1 groot or penny
6 Schilling-lubs		1 ſchilling
1 Schilling-lub		2 pence or groots
1 Mark		32 pence or groots
7$\frac{1}{2}$ Marks		1 pound.

The par with Hamburgh, and alſo with Antwerp, is 35s. 6$\frac{2}{3}$d. Flemiſh for 1 l. Sterling.

EXAMPLES. 1. How many marks muſt be received at Hamburgh for 303 l. Sterling, exchange at 35s. 3 d. Flemiſh *per* l. Sterling?

```
     L.  s. d.    L.
  If 1 : 35 3 :: 300
         12
        ———
        423
         300
        ——————  M.  ſch.
  32)126900(3965 10
     96...
     ————
      309
      288
      ———
       210
       192
       ———
        180
        160
        ———
        (20)
         16
        ———
        )320
         32
        ———
         (0)
```

Decimally.

```
  Flem. s. Marks. Flem. s.
   If 20 : 7.5 :: 35.25
       4 : 1.5 :: 35.25
                    1.5
                  ——————
                  17625
                  3525
                  ———————
               4)52.875
                 ————————
Marks in 1 l. Sterling     13.21875
                                300
                           ——————————
Marks in 300 l. Sterling   3965.62500
                                  16
                                ————
                                3750
                                625
                               —————
           Schilling-lubs 10.000
```

2. How much Sterling money will a bill of 3965 mark 10 ſchilling-lubs amount to, exchange at 35s. 3d. Flemiſh *per* pound Sterling?

```
        Fl. s.  d.  L. St.   Mks.  ſch.
     If 35    3  :  1  ::   3965   10
        12                    32    2
       ----                 ----   --
        423                 7930   20d.
                           11897
                       423)126900(300 l. ſter.
                           1269
                       Decimally.
                       4 : 1.5 :: 35.25
                                   1.5
                                 -----
                                 17625
                                 2225
                                 -----
                              4)52.875(13.21875
                 13.21875)3965.62500(300 l. ſter.
                          3965625
```

III. *Exchange with France.*

MONEY-TABLE.

			Par in Ster.	s. d.
12 Deniers	make	1 ſol	=	0 0 39/80
20 Sols		1 livre	=	0 9¾
3 Livres		1 crown	=	2 5¼

At Paris, Rouen, Lyons, &c. books and accounts are kept in livres, ſols, and deniers; and the exchange with Britain is on the crown, or ecu, of 3 livres, or 60 ſols Tournois. Britain gives for the crown an uncertain number of pence commonly between 30 and 34, the par, as mentioned above, being 29¼d.

EXAMPLE. 1. What ſterling money muſt be paid in London to receive in Paris 1978 crowns 25 ſols, exchange at 31⅝d. per crown?

```
      Sols.   d.       Cr.   ſols.
   If 63 :  31⅝  ::   1978   25
            ----        60
            253       ------
                      118705
                         253
                      ------
                      356115
                     593525
                    237410
                 6|0)3003236|5 Rem.
                     ---------
                    8)500539   3
                   12)62567   11
                     -------
                    2|0)521|3   13
                     ---------
                   L. 260 13 11⅜ Ans.
              By Practice.
                   Cr.   Sols.
                  1978   25, at 31⅝
      d.          ---------------
      30 = ⅛    |  247   5   0
     1½ = 1/20  |   12   7   3
      ⅛ = 1/12  |    1   0   7¼
Sols 20 = ⅓     |    0   0  10½
       5 = ¼    |    0   0   2¼
                   ------------
                   260  13  11¼
```

If you work decimally, ſay,

```
     Cr.  d. Ster.     Cr.          d. Ster.
As 1 : 31.625 :: 1978.416 : 62567.427083
```

2. How many French livres will L. 121 : 18 : 6 Sterling amount to, exchange at 32⅞d. per crown?

```
        d.   Liv.    L.   s.  d.
    If 32⅞ : 3 ::   121  18   6
       ----    8     20
       263    --   ----
              24   2438
                     12
                  -----
                  29262
                     24
                 ------
                 117048
                 58524
                 ------ Liv. ſols. den.
           263)702288(2670   5   11 Ans.
            Rem. (78=5 ſols 11 deniers.
```

IV. *Exchange with Portugal.*

MONEY-TABLE.

			Par. in Ster.	s. d. f.
		1 ree	=	0 0 0.27
400 rees	make	1 cruſade	=	2 3
1000 rees		1 millree	=	5 7½

In Liſbon, Oporto, &c. books and accounts are generally kept in rees and millrees; and the millrees are diſtinguiſhed from the rees by a mark ſet between them thus, 485 Ɏ 372; that is, 485 millrees and 375 rees.

Britain, as well as other nations, exchanges with Portugal on the millree; the par, as in the table, being 67½ Sterling. The courſe with Britain runs from 63d. to 68d. Sterling *per* millree.

EXAMPLE. 1. How much Sterling money will pay a bill of 827 Ɏ 160 rees, exchange at 63⅜d. Sterling *per* millree?

```
     Rees.     d.      Rees.
  If 1000  :  63⅜  ::  827.160
     8                     507
    ----     ----     -------
    8000      507      579012
                      413580
                      ------------ Rem.
               8000)419370.120   2
                    -----------
                 12) 52421   — 5d.
                    ------
                 20)  4368   — 8s.
                     ---------
                   L. 218 8 5¼  Ans.

                 By Practice.
                    Rees.
              | 827.160, at 63⅜d.
     d.       | --------
     60 = ¼   | 206.790
      3 = 1/20|  10.3395
      ¼ = 1/12|    .861625
      ⅛ = ½   |    .4308125
              | -----------
              | 218.4219375
```

The rees being thouſandth-parts of the millrees, are annexed to the integer, and the operation proceeds exactly as in decimals.

2. How many rees of Portugal will 500 l. Sterling amount to, exchange at 5s. $4\frac{5}{8}$d. *per* millree?

$$\begin{array}{llll}
 & d. & \textit{Rees.} & \textit{L.} \\
\text{If} & 64\frac{5}{8} : & 1000 :: & 500 \\
 & & 8 & 20 \\
 & 517 & 8000 & 10000 \\
 & & & 12 \\
 & & & 120000 \\
 & & & 8000 \\
\end{array}$$

$$\begin{array}{r}
\textit{Rees.} \\
517)960000000(1856.866\ \textit{Anſ.}
\end{array}$$

V. *Exchange with Spain.*

Money-table.

				Par in Sterl.	s.	d.
35 mervadies	make	1 rial	=		0	$5\frac{3}{8}$
8 rials		1 piaſtre	=		3	7
375 mervadies		1 ducat	=		4	$11\frac{1}{4}$

In Madrid, Bilboa, Cadiz, Malaga, Seville, and moſt of the principal places, books and accounts are kept in piaſtres, called alſo *dollars*, rials, and mervadies; and they exchange with Britain generally on the piaſtre, and ſometimes on the ducat. The courſe runs from 35 d. to 45 d. Sterling for a piaſtre or dollar of 8 rials.

Examp. 1. London imports from Cadiz goods to the value of 2163 piaſtres and 4 rials: How much Sterling will this amount to, exchange at $38\frac{3}{8}$d. Sterling *per* piaſtre?

$$\begin{array}{ll|lll}
 & & \textit{Piaſt.} & \textit{Rials.} & \\
 & & 2163 & 4, & \text{at } 31\frac{3}{8}\text{d.} \\
d. & & & & \\
24 = & \frac{1}{16} & 216 & 6 & \\
12 = & \frac{1}{2} & 108 & 3 & \\
2 = & \frac{1}{6} & 18 & 0 & 6 \\
\frac{2}{8} = & \frac{1}{8} & 2 & 5 & 0\frac{3}{4} \\
\frac{1}{8} = & \frac{1}{2} & 1 & 2 & 6\frac{3}{8} \\
 & & 345 & 17 & 1\frac{1}{8} \\
 & & & 1 & 7\frac{3}{16} \\
 & \textit{L.} & 345 & 18 & 8\frac{5}{16}\ \textit{Anſ.}
\end{array}
\qquad
\begin{array}{r|l}
 & d. \\
\textit{Rials.} & 38\frac{3}{8}\text{ each.} \\
4 = & 19\frac{3}{16}
\end{array}$$

2. London remits to Cadiz 345l. 18s. $8\frac{5}{16}$d. How much Spaniſh money will this amount to, exchange at $38\frac{3}{8}$d. Sterling *per* piaſtre?

$$\begin{array}{llllll}
d. & \textit{Piaſt.} & \textit{L.} & s. & d. \\
\text{If } 38\frac{3}{8} : & 1 :: & 345 & 18 & 8\frac{5}{16} \\
 & & 20 & & \\
307 & & & & \\
2 & & 6918 & & \\
 & & 12 & & \\
614 & & & & \\
 & & 83024 & & \\
 & & 16 & & \\
 & & 498149 & & \\
 & & 83024 & & \\
\text{Carr. up} & & 1328389 & &
\end{array}$$

$$\begin{array}{l}
614(1328389(2163\text{ piaſtres.} \\
1228\cdots \\
1003 \\
614 \\
3898 \\
3684 \\
2149 \\
1842 \\
307 \\
8 \\
614)2456(4\text{ rials.} \\
2456
\end{array}$$

$$\begin{array}{lll}
 & \textit{Piaſt.} & \textit{Rials.} \\
\textit{Anſ.} & 2163 & 4
\end{array}$$

VI. *Exchange with Venice.*

Money-table.

$5\frac{1}{6}$ Soldi	make	1 gros	
24 Gros		1 ducat	$=50\frac{1}{4}$d. Sterling.

The money of Venice is of three ſorts, *viz.* two of bank money, and the picoli money. One of the banks deals in banco money, and the other in banco current. The bank money is 20 *per cent.* better than the banco current, and the banco current 20 *per cent.* better than the picoli money. Exchanges are always negociated by the ducat banco, the par being 4s. $2\frac{1}{4}$d. Sterling, as in the table.

Though the ducat be commonly divided into 24 gros, yet bankers and negotiators, for facility of computation, uſually divide it as follows, and keep their books and accounts accordingly.

12 Deniers d'or	make	1 ſol d'or	
20 Sols d'or		1 ducat	$=50\frac{1}{4}$d. Sterling.

The courſe of exchange is from 45d. to 55d. Sterling *per* ducat.

Examp. 1. How much Sterling money is equal to 1459 ducats 18 ſols 1 denier, bank-money of Venice, exchange at $52\frac{3}{4}$d. Sterling *per* ducat?

$$\begin{array}{llllll}
\textit{Duc.} & d. & \textit{Duc.} & \textit{ſol.} & \textit{den.} \\
\text{If } 1 : & 52\frac{3}{4} :: & 1459 & 18 & 1 \\
 & & 52\frac{3}{4} & & \\
 & & 2918 & & \\
 & & 7295 & & \\
 & d. & 75868 & & \\
 & \frac{1}{2} = & 729\frac{4}{8} & & \\
 & \frac{1}{4} = & 364\frac{6}{8} & & \\
 & & 76962\frac{2}{8} & & \\
 & & 47\frac{5}{8} & & \\
 & & & \textit{Rem.} & \\
 & & 12)77010(6\text{d.} & & \\
 & & 2|0)641|7(17\text{s.} & & \\
 & \textit{L.} & 320 & 17 & 6\text{ Sterling.}\ \textit{Anſ.}
\end{array}
\qquad
\begin{array}{r|l}
 & d. \\
 & 52\frac{3}{4}\text{ rate.} \\
\textit{Sols.} & \\
10 = \frac{1}{2} & 26\frac{3}{8} \\
5 = \frac{1}{2} & 13\frac{1}{8} \\
2 = \frac{1}{5} & 5\frac{2}{8} \\
1 = \frac{1}{2} & 2\frac{5}{8} \\
\text{den. } 1 = \frac{1}{12} & 0\frac{2}{8} \\
 & 47\frac{5}{8}
\end{array}$$

Exchange.

2. How many ducats at Venice are equal to 385 l. 12 s. 6d. Sterling, exchange at 4s. 4d. *per* ducat ?

L. *Duc.* *L.*
If .216 : 1 :: 385.625
.216)385.625
21 385.625
Duc.
195)247062.5(1779.8 *Anſ.*
195
1520
1365
1556
1365
1912
1755
1575
1560
(15)

Bank-money is reduced to current money, by allowing for the agio, as was done in exchange with Holland ; *viz.* ſay, As 100 to 120, or as 10 to 12, or as 5 to 6, ſo the given bank-money to the current ſought. And current money is reduced to bank-money by reverſing the operation. And in like manner may picoli-money be reduced to current or to bank money, and the contrary.

100 ducats banco of Venice.

In Leghorn = 73 pezzos | In Lucca = 77 crowns
In Rome = $68\frac{1}{2}$ crowns | In Francfort = $139\frac{1}{2}$ florins.

VII. *Exchange with Genoa.*

MONEY-TABLE.

			s.	*d.*
12 Denari	make	1 ſoldi		
20 Soldi	make	1 pezzo =	4	6 Sterling.

Books and accounts are generally kept in pezzos, ſoldi, and denari : but ſome keep them in lires, ſoldi, and denari ; and 12 ſuch denari make 1 ſoldi, and 20 ſoldi make 1 lire.

The pezzo of exchange is equal to $5\frac{3}{4}$ lires ; and, conſequently, exchange-money is $5\frac{3}{4}$ times better than the lire money. The courſe of exchange runs from 47 d. to 58 d. Sterling *per* pezzo.

EXAMP. How much Sterling money is equivalent to 3390 pezzos 16 ſoldi of Genoa, exchange at $51\frac{7}{8}$d. Sterling *per* pezzo ?

Soldi. *d.* *Pez.* *Soldi.*
If 20 : $51\frac{7}{8}$ :: 3396 16
8 20
415
160 67816
415
339080
67816
271264
d. *L.* *s.* *d.*
160)28143640($175897\frac{3}{4}$ = 732 18 $1\frac{8}{4}$

If Sterling money be given, it may be reduced or changed into pezzos of Genoa, by reverſing the former operation.

Exchange.

Exchange money is reduced to lire-money, by being multiplied by $5\frac{3}{4}$, as follows :

	Pez.	*ſoldi.*	Decimally.
	3390	16	3390.8
		$5\frac{3}{4}$	5.75
	16954	0	169540
$\frac{1}{2}$ =	1695	8	237356
$\frac{1}{4}$ =	847	14	169540
Lires	19497	2	Lires 19497.100

And lire-money is reduced to exchange-money by dividing it by $5\frac{3}{4}$.

In Milan, 1 crown = 80
In Naples, 1 ducat = 86
In Leghorn, 1 piaſtre = 20
In Sicily, 1 crown = $127\frac{2}{9}$

VIII. *Exchange with Leghorn.*

MONEY-TABLE.

			s.	*d.*
12 Denari	make	1 ſoldi		
20 Soldi	make	1 piaſtre =	4	6 *Sterl.*

Books and accounts are kept in piaſtres, ſoldi, and denari. The piaſtre here conſiſts of 8 lires, and the lire contains 20 ſoldi, and the ſoldi 12 denari, and conſequently exchange-money is 6 times better than lire money. The courſe of exchange is from 47d. to 58 d. Sterling *per* piaſtre.

EXAMPLE. What is the Sterling value of 731 piaſtres, at $55\frac{1}{2}$ each ?

s.	*d.*	731 piaſtres, at $55\frac{1}{2}$ d.		
4 or	48 = $\frac{1}{5}$	146	4	
	6 = $\frac{1}{8}$	18	5	6
	$1\frac{1}{2}$ = $\frac{1}{4}$	4	11	$4\frac{1}{2}$
		L. 169	0	$10\frac{1}{2}$ *Anſ.*

Sterling-money is reduced to money of Leghorn, by reverſing the former operation ; and exchange-money is reduced to lire-money by multiplying by 6, and lire-money to exchange-money by dividing by 6.

100 piaſtres of Leghorn are

In Naples = 134 ducats | In Geneva = $185\frac{1}{3}$ crowns

Soldi of Leghorn.

In Sicily, 1 crown = $133\frac{1}{3}$
In Sardinia, 1 dollar = $95\frac{5}{9}$

The above are the chief places in Europe with which Britain exchanges directly ; the exchanges with other places are generally made by bills on Hamburgh, Holland, or Venice. We ſhall here, however, ſubjoin the par of exchange betwixt Britain and moſt of the other places in Europe with which ſhe has any commercial intercourſe.

	Par in Sterling			*L.* *s.*	*d.*
Rome,	1	crown	=	6	$1\frac{2}{3}$
Naples,	1	ducat	=	3	$4\frac{1}{2}$
Florence,	1	crown	=	5	$4\frac{5}{8}$
Milan,	1	ducat	=	4	7
Bologna,	1	dollar	=	4	3
Sicily,	1	crown	=	5	0
Vienna,	1	rixdollar	=	4	8
Augſburgh,	1	florin	=	3	$1\frac{1}{3}$
Francfort,	1	florin	=	3	9
Bremen,	1	rixdollar	=	3	6
Breſlau,	1	rixdollar	=	3	3

Berlin,

		Par in Sterling		*L.*	*s.*	*d.*
Berlin,	1	rixdollar	=		4	0
Stetin,	1	mark	=		1	6
Embden,	1	rixdollar	=		3	6
Bolſenna,	1	rixdollar	=		3	8
Danzic,	$13\frac{1}{2}$	florins	=	1	0	0
Stockholm,	$34\frac{1}{7}$	dollars	=	1	0	0
Ruſſia,	1	ruble	=		4	5
Turkey,	1	aſper	=		4	6

The following places, *viz.* Switzerland, Nuremburgh, Leipſic, Dreſden, Oſnaburgh, Brunſwic, Cologn, Leige, Straſburgh, Cracow, Denmark, Norway, Riga, Revil, Narva, exchange with Britain, when direct exchange is made, upon the rixdollar, the par being 4 s. 6 d. Sterling.

IX. *Exchange with America and the Weſt Indies.*

In North America and the Weſt Indies, accounts as in Britain, are kept in pounds, ſhillings, and pence. In N. America formerly they had few coins circulating among them, and on that account had been obliged to ſubſtitute a paper-currency for a medium of their commerce; which having no intrinſic value, was ſubjected to many diſadvantages, and generally ſuffered a great diſcount. In the Weſt Indies coins are more frequent, owing to their commercial intercourſe with the Spaniſh ſettlements.

Exchange betwixt Britain and America, or the Weſt Indies, may be computed as in the following examples:

1. The neat proceeds of a cargo from Britain to Boſton amount to 845 l. 17 s. 6d. currency: How much is that in Sterling money, exchange at 80 *per cent ?*

If 180 : 100

18 : 10 *L. s. d.*

9 : 5 : : 845 17 6

5

9)4229 7 6

L. 469 18 $7\frac{1}{3}$ Ster. *Anſ.*

2. Boſton remits to Britain a bill of 469 l. 18 s. $7\frac{1}{3}$d. Sterling; How much currency was paid for the bill at Boſton, exchange at 80 *per cent ?*

If 100 : 180 *L. s. d.*

5 : 9 : : 469 18 $7\frac{1}{3}$

9

5)4229 7 6

845 17 6 currency. *Anſ.*

3. How much Sterling-money will 1780 l. Jamaica currency amount to, exchange at 40 *per cent?*

If 140 : 100

14 : 10 *L.*

7 : 5 : : 1780

5

7)8900

s. d.

1271 8 $6\frac{1}{7}$ Ster. *Anſ.*

Bills of exchange from America, the rate being high, is an expenſive way of remitting money to Britain: and therefore merchants in Britain generally chooſe to have the debts due to them remitted home in ſugar, rum, or other produce.

X. *Exchange with Ireland.*

At Dublin, and all over Ireland, books and accounts are kept in pounds, ſhillings, and pence, as in Britain; and they exchange on the 100 l. Sterling.

The par of one ſhilling Sterling is one ſhilling and one penny Iriſh; and ſo the par of 100 l. Sterling is 108 l. 6 s. 8d. Iriſh. The courſe of exchange runs from 6 to 15 *per cent.*

Examp. 1. London remits to Dublin 586 l. 10 s. Sterling: How much Iriſh money will that amount to, exchange at $9\frac{5}{8}$ *per cent ?*

L.

If 100 : $109\frac{5}{8}$: : 586.5

8 877

800 : 877 41055

41055

46920

800)514360.5

642.950625

Anſ. 642 l. 19 s. Iriſh.

By practice.

p. cent.	586.5
10 = $\frac{1}{10}$	58.65
2 = $\frac{1}{5}$	11.73 ſub.
8 =	46.92
1 = $\frac{1}{8}$	5.865
$\frac{4}{8}$ = $\frac{1}{2}$	2.9325
$\frac{1}{8}$ = $\frac{1}{4}$	.733125
$9\frac{5}{8}$	56.450625 add.
	642.950625

2. How much Sterling will 625 l. Iriſh amount to, exchange at $10\frac{3}{8}$ *per cent. ?*

If $110\frac{3}{8}$: 100 : : 625

8 800

L. s. d.

883 800 883)500000(566 5 $0\frac{3}{4}$ Ster. *Anſ.*

XI. *Exchange betwixt London and other places in Britain.*

The ſeveral towns in Britain exchange with London for a ſmall premium in favour of London; ſuch as, 1, $1\frac{1}{4}$, &c. *per cent.* The premium is more or leſs, according to the demand for bills?

Examp. Edinburgh draws on London for 860l. exchange at $1\frac{3}{8}$ *per cent*: How much money muſt be paid at Edinburgh for the bill?

	L.
	860
per cent.	
1 = $\frac{1}{100}$	8 12
$\frac{1}{2}$ = $\frac{1}{4}$	2 3
$\frac{1}{8}$ =	1 1 6
	11 16 6 premium.
	871 16 6 paid for the bill.

To avoid paying the premium, it is an uſual practice to take the bill payable at London a certain number of days after date; and in this way of doing, 73 days is equivalent to 1 *per cent*

XII. *Arbitration of Exchanges.*

The courſe of exchange betwixt nation and nation naturally riſes or falls according as the circumſtances and balance of trade happen to vary. Now, to draw upon and remit to foreign places, in this fluctuating ſtate of exchange, in the way that will turn out moſt profitable, is the deſign of arbitration. Which is either ſimple or compound.

I. *Simple Arbitration.*

In ſimple arbitration the rates or prices of exchange from one place to other two are given; whereby is found the correſpondent price between the ſaid two places, called the *arbitrated price*, or *par of arbitration*: and hence is derived a method of drawing and remitting to the beſt advantage.

Examp. 1. If exchange from London to Amſterdam be 33 s. 9 d. *per* pound Sterling; and if exchange from London to Paris be 32 d. *per* crown; what muſt be the rate of exchange from Amſterdam to Paris, in order to be put on a par with the other two?

Ster. Flem. Ster.
s. s. d. d.
If 20 : 33 9 : : 32
12 12
240 405
32
810
1215
240)12960)54 d. Flem. *per* crown. *Anſ.*

2. If exchange from Paris to London be 32d. Sterling *per* crown; and if exchange from Paris to Amſterdam be 54d. Flemiſh *per* crown; what muſt be the rate of exchange between London and Amſterdam, in order to be on a par with the other two?

Ster. Flem. Ster.
d. d. d.
If 32 : 54 : : 240
240
216
108
12) *s. d.*
32)12960(405 (33 9 Flem. *per* l. Ster. *Anſ.*

From theſe operations it appears, that if any ſum of money be remitted, at the rates of exchange mentioned, from any one of the three places to the ſecond, and from the ſecond to the third, again from the third to the firſt, the ſum ſo remitted will come home entire, without increaſe or diminution.

From the par of arbitration thus found, and the courſe of exchange given, is deduced a method of drawing and remitting to advantage, as in the following example.

3. If exchange from London to Paris be 32d. Sterling *per* crown, and to Amſterdam 405 d. Flemiſh *per* pound Sterling; and if, by advice from Holland to France, the courſe of exchange between Paris and Amſterdam is fallen to 52 d. Flemiſh *per* crown; what may be gained *per cent.* by drawing on Paris, and remitting to Amſterdam?

The par of arbitration between Paris and Amſterdam in this caſe, by Ex. 1. is 54 d. Flemiſh *per* crown. Work as under.

d. St. Cr. L. St. Cr.
If 32 : 1 : : 100 : 750 debit at Paris
Cr. d.Fl C. d.Fl.
If 1 : 52 : : 750 : 39000 credit at Amſterdam.
d.Fl. L. St. d. Fl. L. s. d. Ster.
If 405 : 1 : : 39000 : 96 5 11$\frac{1}{9}$ be remitted.
100
3 14 0$\frac{8}{9}$

But if the courſe of exchange between Paris and Amſterdam, inſtead of falling below, riſe above the par of arbitration, ſuppoſe to 56 d. Flemiſh *per* crown; in this caſe, if you propoſe to gain by the negociation, you muſt draw on Amderſtam, and remit to Paris. The computation follows.

L. St. d.Fl. L. St d.Fl
If 1 : 405 :: 100 : 40500 debit at Amſterdam.
d. Fl. Cr. d.F. Cr.
If 56 : 1 :: 40500 : 723$\frac{3}{14}$ credit at Paris.
Cr. d.St. Cr. L. s. d. Ster.
If 1 : 32 : : 723$\frac{3}{14}$: 96 8 6$\frac{6}{7}$ to be remitted.
100
3 11 5$\frac{1}{7}$ gained *per cent.*

In negociations of this ſort, a ſum; for remittance is afforded out of the ſum you receive for the draught: and your credit at the one foreign place pays your debt at the other.

II. *Compound Arbitration.*

In compound arbitration the rate or price of exchange between three, four, or more places, is given, in order to find how much a remittance paſſing through them all will amount to at the laſt place; or to find the arbitrated price, or par of arbitration, between the firſt place and the laſt. And this may be done by the following

Rules. I. Diſtinguiſh the given rates or prices into antecedents and conſequents; place the antecedents in one column, and the conſequents in another on the right, fronting one another by way of equation.

II. The firſt antecedent, and the laſt conſequent to which an antecedent is required, muſt always be of the ſame kind.

III. The ſecond antecedent muſt be of the ſame kind with the firſt conſequent, and the third antecedent of the ſame kind with the ſecond conſequent, &c.

IV. If to any of the numbers a fraction be annexed, both the antecedent and its conſequent muſt be multiplied into the denominator.

V. To facilitate the operation, terms that happen to be equal or the ſame in both columns, may be dropped or rejected, and other terms may be abridged.

VI. Multiply the antecedents continually for a diviſor, and the conſequents continually for a dividend, and the quot will be the anſwer or antecedent required.

Examp. 1. If London remit 1000 l. Sterling to Spain, by way of Holland, at 35 s. Flemiſh *per* pound Sterling; thence to France, at 58 d. Flemiſh *per* crown; thence to Venice, at 100 crowns *per* 60 ducats; and thence to Spain, at 360 mervadies *per* ducat; how many piaſtres, of 272 mervadies, will the 1000 l. Sterling amount to in Spain?

Antecedents.		*Conſequents.*	*Abridged.*
1 l. Sterling	=	35 s. or 420 d. Fl.	1 = 210
58 d. Flemiſh	=	1 crown France	29 = 1
100 crowns France	=	60 ducats Venice	1 = 30
1 ducat Venice	=	360 mervadies Spain	1 = 45
272 mervadies	=	1 piaſtre	17 = 1
How many piaſtres	=	1000 l. Sterling	= 10

In order to abridge the terms, divide 58 and 420 by 2, and you have the new antecedent 29, and the new conſequent 210; reject two ciphers in 100 and 1000; divide 272 and 360 by 8, and you have 34 and 45; divide 34 and 60 by 2, and you have 17 and 39; and the whole will ſtand abridged as above.

Then, 29 × 17 = 493 diviſor; and 210 × 30 × 45 × 10 = 2835000 dividend: and, 493)2835000($5750\frac{1}{2}$ piaſtres. *Anſ.*

Or, the conſequents may be connected with the ſign of multiplication, and placed over a line by way of numerator; and the antecedents, connected in the ſame manner, may be placed under the line, by way of denominator; and then abridged as follows:

$$\frac{420\times60\times360\times100}{58\times100\times272}=\frac{210\times60\times360\times10}{29\times1\times272}$$

$$=\frac{210\times60\times45\times10}{29\times34}=\frac{210\times30\times45\times10}{29\times17}$$

$$=\frac{2835000,}{493}$$

And, 493)2835000($5750\frac{1}{2}$ piaſtres. *Anſ.*

The placing the terms by way of antecedent and conſequent, and working as the rules direct, ſave ſo many ſtatings of the rule of three, and greatly ſhortens the operation. The proportion at large for the above queſtion would ſtand as under.

	L. St.		*d. Fl.*		*L. St.*		*d. Fl.*
If	1	:	420	::	1000	:	420000
	d. Fl.		*Cr.*		*d. Fl.*		*Cr.*
If	58	:	1	::	420000	:	$7241\frac{1}{2}\frac{1}{9}$
	Cr.		*Duc.*		*Cr.*		*Duc.*
If	100	:	63	::	$7241\frac{1}{2}\frac{1}{9}$	:	$4344\frac{2}{2}\frac{4}{9}$
	Duc.		*Mer.*		*Duc.*		*Mer.*
If	1	:	360	::	$4344\frac{2}{2}\frac{4}{9}$	:	$1564137\frac{2}{2}\frac{7}{9}$
	Mer.		*Piaſt.*		*Mer.*		*Piaſt.*
If	272	:	1	::	$1564137\frac{2}{2}\frac{7}{9}$	:	$5750\frac{2}{4}\frac{5}{9}\frac{0}{3}$

If we ſuppoſe the courſe of direct exchange to Spain to be $42\frac{1}{2}$d. Sterling *per* piaſtre, the 1000 l. remitted would only amount to $5647\frac{1}{2}$ piaſtres; and, conſequently, 103 piaſtres are gained by the negociation; that is, about 2 *per cent.*

2. A banker in Amſterdam remits to London 400 l. Flemiſh; firſt to France at 56 d. Flemiſh *per* crown; from France to Venice, at 100 crowns *per* 60 ducats; from Venice to Hamburgh, at 100d. Flemiſh *per* ducat from Hamburgh to Liſbon, at 50d. Flemiſh *per* cruſade of 400 rees; and, laſtly, from Liſbon to London at 64d. Sterling *per* millree: How much Sterling money will the remittance amount to? and how much will be gained or ſaved, ſuppoſing the direct exchange from Holland to London at 36s. 10d. Flemiſh *per* pound Sterling?

Antecedents.		*Conſequents.*
56d. Flem.	=	1 crown
100 crowns	=	60 ducats.
1 ducat	=	100 d. Flem.
50 d. Flem.	=	400 rees.
1000 rees	=	64d. Sterling.
How many d. Ster.	=	400 l. or 96000 d. Flemiſh?

This, in the fractional form, will ſtand as follows.

$$\frac{60\times100\times400\times64\times96000}{65\times100\times50\times1000}=\frac{368640}{7}\text{, and}$$

7)368640($52662\frac{6}{7}$d. Ster. = 219l. 8s $6\frac{6}{7}$d. St. *Anſ.*

To find how much the exchange from Amſterdam directly to London, at 36 s. 10 d. Flemiſh *per* l. Sterling, will amount to, ſay,

s.	*d.*		*d. Fl.*		*L. St.*		*d. Fl.*		*L.*	*s.*	*d. St.*
36	10	If	442	:		::	96000	:	217	3	$10\frac{1}{2}$
12									219	8	$6\frac{3}{4}$
442							Gained or ſaved,		2	4	$8\frac{1}{4}$

In the above example, the par of arbitration, or the arbitrated price, between London and Amſterdam, viz. the number of Flemiſh pence given for 1 l. Sterling, may be found thus:

Make 64d. Sterling, the price of the millree, the firſt antecedent; then all the former conſequents will become antecedents, and all the antecedents will become conſequents. Place 240, the pence in l. Sterling, as the laſt conſequent, and then proceed as taught above, viz.

Antecedents.		*Conſequents.*
64d. Ster.	=	1000 rees.
400 rees	=	50d. Flem.
100d. Flem.	=	1 ducat.
60 ducats	=	100 crowns.
1 crown	=	56d. Flem.
How many d. Flem.	=	240d. Ster.?

$$\frac{1000\times50\times100\times56\times240}{64\times400\times100\times60}=\frac{875}{2}\text{, and}$$

2)875($437\frac{1}{2}$d. = 36s. $5\frac{1}{2}$d. Flem. *per* l. Ster. *Anſ.*

Or the arbitrated price may be found from the anſwer to the queſtion, by ſaying

	d. Ster.		*d. Flem.*		*d. St.*
If	$\frac{368640}{7}$	:	96000	::	240

$$\begin{array}{r} 7 \\ \hline 672000 \\ 240 \\ \hline 2688 \\ 1344 \\ \hline \end{array}$$

$368640)161280000(437\frac{1}{2}$ d. = 36 s. $5\frac{1}{2}$ d. *Flem.* as before.

The work may be proved by the arbitrated price thus: As 1l. Sterling to 36s. $5\frac{1}{2}$d. Flemiſh, ſo 219l. 8s. $6\frac{6}{7}$d. Sterling to 400l. Flemiſh.

The arbitrated price compared with the direct courſe ſhows whether the direct or circular remittance will be moſt advantageous, and how much. Thus the banker at Amſterdam will think it better exchange to receive 1 l. Sterling for 36s. 5½d. Flemiſh, than for 36s. 10d. Flemiſh.

Exchange ſignifies alſo a place in moſt conſiderable trading cities, wherein the merchants, negociants, agents, bankers, brokers, interpreters and other perſons concerned in commerce, meet on certain days, and at certain times thereof, to confer and treat together of matters relating to exchanges, remittances, payments, adventures, aſſurances, freightments, and other mercantile negociations, both by ſea and land.

In Flanders, Holland, and ſeveral cities of France, theſe places are called *burſes*; at Paris and Lyons, *places de change*; and in the Hanſe towns, *colleges of merchants*. Theſe aſſemblies are held with ſo much exactneſs, and merchants and negociants are ſo indiſpenſably required to attend at them, that a perſon's abſence alone makes him be ſuſpected of a failure or bankruptcy. The moſt conſiderable exchanges in Europe, are that of Amſterdam; and that of London, called the *Royal Exchange*.

Even in the time of the ancient Romans, there were places for the merchants to meet, in moſt of the conſiderable cities of the empire. That ſaid by ſome to have been built at Rome in the year of the city 259, 493 years before our Saviour, under the conſulate of Appius Claudius and Publius Servilius, was called *collegium mercatorum*; whereof it is pretended there are ſtill ſome remains, called by the modern Romans *loggia*, the lodge; and now uſually, the Place of St George. This notion of a Roman exchange is ſuppoſed to be founded on the authority of Livy, whoſe words are as follow; viz. *Certamen conſulibus inciderat, uter dedicaret Mercurii ædem. Senates a ſe rem ad populum rejecit: utri eorum dedicatio juſſu populi data eſſet, eum præeſſe annonæ mercatorium collegium inſtituere juſſit.* Liv. lib. ii. But it muſt be here remarked, that *collegium* never ſignified a building for a ſociety in the purer ages of the Latin tongue; ſo that *collegium mercatorum inſtituere* muſt not be rendered to build an exchange for the merchants, but to incorporate the merchants into a company. As Mercury was the God of traffick, this *ædes Mercuri* ſeems to have been chiefly deſigned for the devotions of this company or corporation.

EXCHEQUER, in the Britiſh juriſprudence, an ancient court of record, in which all cauſes concerning the revenues and rights of the crown are heard and determined, and where the crown revenues are received. It took this name from the cloth that covered the table of the court, which was party-coloured, or chequered.

This court is ſaid to have been erected by William the Conqueror, its model being taken from a like court eſtabliſhed in Normandy long before that time. Anciently its authority was ſo great, that it was held in the king's palace, and the acts thereof were not to be examined or controlled in any other of the king's courts; but, at preſent, it is the laſt of the four courts at Weſtminſter.

In the exchequer, ſome reckon ſeven courts, viz. thoſe of pleas, accounts, receipts, exchequer-chamber (which is an aſſembly of all the judges on difficult matters in law), errors in the exchequer, errors in the king's bench, and, laſtly, the court of equity in the exchequer.

But the exchequer, for the diſpatch of buſineſs, is generally divided into two parts; one of which is chiefly converſant in the judicial hearing and deciding of all cauſes relating to the king's coffers, formerly termed the *exchequer of accounts*: the other is called the *receipt of the exchequer*, being principally employed in receiving and paying of money.

Officers of the receipt may take one penny in the pound, as their fees for ſums iſſued out; and they are obliged, without delay, to receive the money brought thither; and the money received is to be put into cheſts under three different locks and keys, kept by three ſeveral officers. All ſheriffs, bailiffs, &c. are to account in the exchequer; and in the lower part, termed the receipt, the debtors of the king, and perſons in debt to them, the king's tenants, and the officers and miniſters of the court, are privileged to ſue one another, or any ſtranger, and to be ſued in the like actions as are brought in the courts of king's bench and common-pleas.

The judicial part of the exchequer, is a court both of law and equity. The court of law is held in the office of pleas, according to the courſe of common law, before the barons: in this court, the plaintiff ought to be a debtor or accomptant to the king; and the leading proceſs is either a writ of ſubpœna, or quo minus, which laſt goes into Wales, where no proceſs out of courts of law ought to run, except a capias utlagatum.

The court of equity is held in the exchequer chamber before the treaſurer, chancellor, and barons; but, generally, before the barons only: the lord chief baron being the chief judge to hear and determine all cauſes. The proceedings in this part of the exchequer are by Engliſh bill and anſwer, according to the practice of the court of chancery; with this difference, that the plaintiff here muſt ſet forth, that he is a debtor to the king, whether he be ſo or not. It is in this court of equity that the clergy exhibit bills for the recovery of their tythes, &c. Here too the attorney-general exhibits bills for any matters concerning the crown; and a bill may be exhibited againſt the king's attorney by any perſon aggrieved in any cauſe proſecuted againſt him on behalf of the king, to be relieved therein; in which caſe, the plaintiff is to attend on the attorney-general, with a copy of the bill, and procure him to give in an anſwer thereto; in the making of which he may call in any perſon intereſted in the cauſe, or any officer, or others, to inſtruct him, that the king not be prejudiced thereby, and his anſwer is to be put in without oath.

But, beſides the buſineſs relating to debtors, farmers, receivers, accountants, &c. all penal puniſhments, intruſions and forfeitures upon popular actions, are matters likewiſe cognizable by this court; where there alſo ſits a puiſne-baron, who adminiſters the oaths to high ſheriffs, bailiffs, auditors, receivers, collectors, comptrollers, ſurveyors, and ſearchers of all the cuſtoms, &c.

The exchequer in Scotland has the ſame privileges and juriſdiction as that of England, and all matters competent to the one are likewiſe competent to the other.

Black Book of the Exchequer, is a book under the keeping of the two chamberlains of the exchequer; ſaid to have been compoſed in 1175 by Gervais of Tilbury, nephew of king Henry II. and divided into ſeveral chapters. Herein is contained a deſcription of the court of England, as it then ſtood, its officers, their ranks, privileges, wages, perquiſites, power, and juriſdiction; and the revenues of the crown, both in money, grain, and cattle. Here we find, that for one ſhilling, as much bread might be bought as would ſerve 100 men a whole day; that the price of a fat bullock was only 12 ſhillings, and a ſheep four, &c.

Chancellor of the Exchequer. See Chancellor.

Exchequer-Bills. By ſtatute 5 Ann c. 13. the lord-treaſurers may cauſe exchequer bills to be made of any ſums not exceeding 1,500,000 l. for the uſe of the war; and the duties upon houſes were made chargeable with 4 l. 10 s. *per cent. per annum* to the bank for circulating them. The bank not paying the bills, actions to be brought againſt the company, and the money and damages recovered: and if any exchequer-bills be loſt, upon affidavit of it before a baron of the exchequer, and certificate from ſuch baron, and ſecurity to pay the ſame if found, duplicates are to be made out: alſo when bills are defaced, new ones ſhall be delivered. The king, or his officers in the exchequer, by former ſtatutes, might borrow money upon the credit of bills, payable on demand, with intereſt after the rate of 3 d. *per diem* for every 100 l. bill. And by 8 & 9 W. 3. c. 20. an intereſt of 5 d. a-day was allowed for every 100l. But 12 W. 3. c. 1. lowered the intereſt on theſe bills to 4d. a-day *per cent.* And by 12 Ann. c. 11. it is ſunk to 2d. a-day.—Forging exchequer bills, or the indorſements thereof, is felony.

EXCISE, (from the Belgic *accüſſe*, tributum, "tribute)," an inland duty or impoſition, paid ſometimes upon the conſumption of the commodity, or frequently upon the wholeſale, which is the laſt ſtage before the conſumption. This is doubtleſs, impartially ſpeaking, the moſt œconomical way of taxing the ſubject, the charges of levying, collecting, and managing the exciſe-duties, being conſiderably leſs in proportion than in other branches of the revenue. It alſo renders the commodity cheaper to the conſumer, than charging it with cuſtoms to the ſame amount would do; for the reaſon juſt now given, becauſe generally paid in a much later ſtage of it. But, at the ſame time, the rigour and arbitrary proceedings of exciſe laws ſeem hardly compatible with the temper of a free nation. For the frauds that might be committed in this branch of the revenue, unleſs a ſtrict watch is kept, make it neceſſary, wherever it is eſtabliſhed, to give the officers a power of entering and ſearching the houſes of ſuch as deal in exciſeable commodities, at any hour of the day, and, in many caſes, of the night likewiſe. And the proceedings, in caſe of tranſgreſſions, are ſo ſummary and ſudden, that a man may be convicted in two days time in the penalty of many thouſand pounds, by two commiſſioners or juſtices of the peace; to the total excluſion of the trial by jury, and diſregard of the common law. For which reaſon, tho' lord Clarendon tells us, that to his knowledge the earl of Bedford (who was made lord treaſurer by king Charles I. to oblige his parliament) intended to have ſet up the exciſe in England, yet it never made a part of that unfortunate prince's revenue; being firſt introduced, on the model of the Dutch prototype, by the parliament itſelf after its rupture with the crown. Yet ſuch was the opinion of its general unpopularity, that when in 1642 "aſperſions were caſt by malignant perſons upon the houſe of commons, that they intended to introduce exciſes, the houſe for its vindication therein did declare, that theſe rumours were falſe and ſcandalous, and that their authors ſhould be apprehended and brought to condign puniſhment." Its original eſtabliſhment was in 1643, and its progreſs was gradual; being at firſt laid upon thoſe perſons and commodities where it was ſuppoſed the hardſhip would be leaſt perceivable, viz. the makers and venders of beer, ale, cyder, and perry; and the loyaliſts at Oxford ſoon followed the example of their brethren at Weſtminſter, by impoſing a ſimilar duty: both ſides proteſting, that it ſhould be continued no longer than to the end of the war, and then be utterly aboliſhed. But the parliament at Weſtminſter ſoon after impoſed it on fleſh, wine, tobacco, ſugar, and ſuch a multitude of other commodities, that it might be fairly denominated *general*: in purſuance of the plan laid down by Mr. Pymme (who ſeems to have been the father of the exciſe) in his letter to Sir John Hotham, ſignifying, "that they had proceeded in the exciſe to many particulars, and intended to go on farther; but that it would be neceſſary to uſe the people to it by little and little." And afterwards, when the nation had been accuſtomed to it for a ſeries of years, the ſucceeding champions of liberty boldly and openly declared "the impoſt of exciſe to be the moſt eaſy and indifferent levy that could be laid upon the people;" and accordingly continued it during the whole uſurpation. Upon king Charles's return, it having then been long eſtabliſhed and its produce well known, ſome part of it was given to the crown, in 12 Car. II. by way of purchaſe for the feudal tenures and other oppreſſive parts of the hereditary revenue. But, from its firſt original to the preſent time, its very name has been odious to the people. It has, nevertheleſs, been impoſed on abundance of other commodities in the reigns of king William III. and every ſucceeding prince, to ſupport the enormous expences occaſioned by the wars on the continent. Thus brandies and other ſpirits are now exciſed at the diſtillery; printed ſilks and linens, at the printer's; ſtarch and hair powder, at the maker's; gold and ſilver wire, at the wiredrawer's; all plate whatſoever, firſt in the hands of the vender, who pays yearly for a licence to ſell it; and afterwards in the hands of the occupier, who alſo pays an annual duty for having it in his cuſtody; and coaches and other wheel-carriages, for which the occupier is exciſed; tho' not with the ſame circumſtances of arbitrary ſtrictneſs with regard to plate and coaches as in the other inſtances. To theſe we may add coffee and tea, chocolate and cocoa paſte, for which the duty is paid by the retailer; all artificial wines, commonly called *ſweets*; paper and paſteboard, firſt when made, and again if ſtained or printed; malt, as beforementioned; vinegars; and the manufacture of glaſs; for all which the duty is paid by the manufacturer; hops, for which the perſon that gathers them is anſwerable; candles and ſoap, which are paid for at the maker's; malt liquors brewed for ſale, which are exciſed at the brewery; cyder and perry at the venders;

Blackſt. Comment.

der's; leather and ſkins, at the tanner's; and, lately, tobacco, at the manufacturer's: A liſt, which no friend to his country would wiſh to ſee farther increaſed.

The exciſe was formerly farmed out; but is now managed for the king by commiſſioners in both kingdoms, who receive the whole product of the exciſe, and pay it into the exchequer. Theſe commiſſioners are nine in number in England, and five in Scotland. The former have a ſalary of 1000 l. a year, the latter 600 l. They are obliged by oath to take no fee or reward but from the king himſelf; and from them there lies an appeal to five other commiſſioners called *commiſſioners of appeals*.

EXCISION, in ſurgery, the cutting out, or cutting off, any part of the body.

Excision, in a ſcripture ſenſe, means the cutting off of a perſon from his people, by way of puniſhment for ſome ſin by him committed. The Jews, Selden informs us, reckon up 36 crimes, to which they pretend this puniſhment is due. The Rabbins reckon three kinds of exciſion; one, which deſtroys only the body; another, which deſtroys the ſoul only; and a third, which deſtroys both body and ſoul. The firſt kind of exciſion they pretend is an untimely death; the ſecond is an utter extinction of the ſoul; and the third, a compound of the two former: thus, making the ſoul mortal or immortal, ſays Seldon, according to the degrees of miſbehaviour and wickedneſs of the people.

EXCLAMATION. See Oratory, n° 85.

EXCLUSION, or *Bill of* Exclusion, a bill propoſed about the cloſe of the reign of king Charles II. for excluding the duke of York, the king's brother, from the throne, on account of his being a Papiſt.

EXCLUSIVE, is ſometimes uſed adjectively, thus; *A patent carries with it an excluſive privilege.* Sometimes adverbially: as, *He ſent him all the numbers from* n° 145 *to* n° 247 *excluſive;* that is, all between theſe two numbers, which themſelves were excepted.

EXCOECARIA, in botany: A genus of the triandria order, belonging to the dioecia claſs of plants; and in the natural method ranking under the 38th order, *Tricoccæ*. The male amentum is naked; there is no calyx nor corolla; there are three ſtyles, and a tricoccous capſule. There is but one ſpecies, the agallocha, or aloes-wood, a native of China and ſome of the Indian iſlands, is about the ſame height and form as the olive tree. Its trunk is of three colours, and contains three ſorts of wood: the heart is that of tambac or calombac, which is dearer in the Indies than even gold itſelf. It ſerves to perfume clothes and apartments; and is eſteemed a ſovereign cordial in fainting fits, a reſtorative in the palſy, and a cure for aſcarides in children. It is burnt as incenſe in the Chineſe and Indian temples; and it is alſo uſed to ſet the moſt precious jewels that are worked in the Indies.

The aloes-wood is very highly valued; and ſtrange fables were invented as to the origin of the tree that yields it; ſome pretending that it grew in Paradiſe, and was only conveyed to us by means of the rivers overflowing their banks and ſweeping off the trees in their way; others affirming that it grew on inacceſſible mountains, where it was guarded by certain wild beaſts, &c. The Siameſe ambaſſadors to the court of France in 1686, who brought a preſent of this wood from their emperor, firſt gave the Europeans any conſiſtent account of it. See *Xylo-Aloes*.

EXCOMMUNICATION, an eccleſiaſtical penalty or cenſure, whereby ſuch perſons as are guilty of any notorious crime or offence, are ſeparated from the communion of the church, and deprived of all ſpiritual advantages.

Excommunication is founded on a natural right which all ſocieties have, of excluding out of their body ſuch as violate the laws thereof; and it was originally inſtituted for preſerving the purity of the church; but ambitious eccleſiaſtics converted it by degrees into an engine for promoting their own power, and inflicted it on the moſt frivolous occaſions.

The power of excommunication, as well as other acts of eccleſiaſtical diſcipline, was lodged in the hands of the clergy, who diſtinguiſhed it into the *greater* and *leſſer*. The leſſer excommunication, ſimply called *aphoriſmos*, "ſeparation or ſuſpenſion," conſiſted in excluding men from the participation of the euchariſt, and the prayers of the faithful. But they were not expelled the church; for they had the privilege of being preſent at the reading of the Scriptures, the ſermons, and the prayers of the catechumens and penitents. This excommunication was inflicted for leſſer crimes; ſuch as neglecting to attend the ſervice of the church, miſbehaviour in it, and the like.

The greater excommunication, called *panteles aphoriſmos*, "total ſeparation and anathema," conſiſted in an abſolute and entire excluſion from the church and the participation of all its rites. When any perſon was thus excommunicated, notice was given of it by circular letters to the moſt eminent churches all over the world, that they might all confirm this act of diſcipline, by refuſing to admit the delinquent to their communion. The conſequences of this latter excommunication were very terrible. The excommunicated perſon was avoided in civil commerce and outward converſation. No one was to receive him into his houſe, nor eat at the ſame table with him; and when dead, he was denied the ſolemn rites of burial.

The Romiſh pontifical takes notice of three kinds of excommunication. 1. The minor, incurred by thoſe who have any correſpondence with an excommunicated perſon. 2. The major, which falls upon thoſe who diſobey the commands of the holy ſee, or refuſe to ſubmit to certain points of diſcipline; in conſequence of which they are excluded from the church militant and triumphant, and delivered over to the devil and his angels. 3. Anathema, which is properly that pronounced by the pope againſt heretical princes and countries. In former ages, theſe papal fulminations were moſt terrible things; but at preſent, they are formidable to none but a few petty ſtates of Italy.

Excommunication, in the Greek church, cuts off the offender from all communion with the 318 fathers of the firſt council of Nice, and with the ſaints; conſigns him over to the devil and the traitor Judas; and condemns his body to remain after death as hard as a flint or piece of ſteel, unleſs he humbles himſelf and makes atonement for his ſins by a ſincere repentance. The form abounds with dreadful imprecations; and the Greeks aſſert, that if a perſon dies excommunicated, the devil enters into the lifeleſs corpſe; and therefore, in order to prevent it, the relations of the deceaſed cut his body in pieces, and boil them in wine. It is a cuſtom for the patriarch of Jeruſalem annually to excommunicate the pope and the church of Rome; on which occaſion, together with a great deal of idle ceremony, he drives a nail into the ground with a hammer, as a mark of malediction.

The form of excommunication in the church of England anciently ran thus: "By the authority of God the Father Almighty, the Son and Holy Ghoſt, and of Mary the bleſſed mother of God, we excommunicate, anathematize, and ſequeſter from the pale of holy mother church, &c." The cauſes of excommunication in England are, contempt of the biſhop's court, hereſy, neglect of public worſhip and the ſacraments, incontinency, adultery, ſimony, &c. It is deſcribed to be two-fold. The leſs is an eccleſiaſtical cenſure, excluding the party from the participation of the ſacraments: the greater proceeds farther, and excludes him not only from theſe, but from the company of all Chriſtians. But if the judge of any ſpiritual court excommunicates a man for a cauſe of which he hath not the legal cognizance, the party may have an action againſt him at common law, and he is alſo liable to be indicted at the ſuit of the king.

Heavy as the penalty of excommunication is, conſidered in a ſerious light, there are, notwithſtanding, many obſtinate or profligate men, who would diſpiſe the *brutum fulmen* of mere eccleſiaſtical cenſures, eſpecially when pronounced by a petty ſurrogate in the country, for railing or contumelious words, for nonpayment of fees or coſts, or other trivial cauſe. The common law, therefore, compaſſionately ſteps in to their aid, and kindly lends a ſupporting hand to an otherwiſe tottering authority. Imitating herein the policy of the ancient Britons, among whom, according to Ceſar, whoever were interdicted by the druids from their ſacrifices, "In numero impiorum ac ſceleratorum habentur: ab iis omnes decedunt, aditum eorum ſermonemque defugiunt, ne quid ex contagione incommodi accipiant: neque iis petentibus jus redditur, neque honos ullus communicatur." And hence by the common law, an excommunicated perſon is diſabled to do any act that is required to be done by one that is *probus et legalis homo*. He cannot ſerve upon juries; cannot be a witneſs in any court; and, which is the worſt of all, cannot bring an action, either real or perſonal, to recover lands or money due to him. Nor is this the whole: for if, within 40 days after the ſentence has been publiſhed in the church, the offender does not ſubmit and abide by the ſentence of the ſpiritual court, the biſhop may certify ſuch contempt to the king in chancery. Upon which there iſſues out a writ to the ſheriff of the county, called from the biſhop's certificate a *ſignificavit*; or from its effect, a writ *de excommunicato capiendo*: and the ſheriff ſhall thereupon take the offender and impriſon him in the county jail, till he is reconciled to the church, and ſuch reconciliation certified by the biſhop; upon which another writ *de excommunicato deliberando*, iſſues out of chancery to deliver and releaſe him.

Excommunication was alſo practiſed among the Jews, who uſed to expel from their ſynagogue ſuch as had committed any grievous, crime. See the Goſpel according to St John, ix. 22. xii. 42. xvi 2. And Joſeph. Antiq. Jud. lib. ix. cap. 22. and lib. xvi. cap. 2.

Godwyn, in his *Moſes and Aaron*, diſtinguiſhes three degrees, or kinds, of excommunication among the Jews. The firſt he finds intimated in John ix. 22. The ſecond in 1 Cor. v. 5. And the third in 1 Cor. xvi. 22. See Niddui.

The rule of the Benedictines gives the name *excommunication* to the being excluded from the oratory, and the common table of the houſe, in the inns of court called *diſcommoning*. This was the puniſhment of ſuch monks as came too late.

Excommunication, or a being ſecluded from a participation in the myſteries of religion, was alſo in uſe under paganiſm.

Such as were thus excommunicated were forbidden to aſſiſt or attend at the ſacrifices, or to enter within the temples; and were afterwards delivered over to the demons and furies of hell, with certain imprecations; which was called among the Romans *diris devovere*. See Execration.

The Druids among the ancient Britons and Gauls, likewiſe, made uſe of excommunication againſt rebels; and interdicted the communion of their myſteries to ſuch as refuſed to acquieſce in their deciſions. See Druids.

EXCORIATION, in medicine and ſurgery, the galling, or rubbing off of the cuticle, eſpecially of the parts between the thighs and about the anus. In adults, it is occaſioned by riding, much walking, or other vehement exerciſe, and may be cured by vulnerary applications. In children there is often an excoriation, not only of the parts near the pudenda, chiefly of the groin and ſcrotum, but likewiſe in the wrinkles of the neck, under the arms, and in other places; proceeding from the acrimony of urine and ſweat; and occaſioning itching pains, crying, watching, reſtleſſneſs, &c. To remedy this, the parts affected may be often waſhed with warm water and ſprinkled with drying powders, as chalk, hartſhorn, but eſpecially tutty, lapis calaminaris, and cerus, which may be tied looſely in a rag, and the powder ſhook out on the parts.

EXCREMENT, whatever is diſcharged out of the body of animals after digeſtion; or the fibrous part of the aliment, mixed with the bile, ſaliva, and other fluids. Urine and the feces are the groſs excrements that are diſcharged out of the bladder or belly. Other excrements are the various humours that are ſecreted from the blood through the different ſtrainers in the body, and which ſerve for ſeveral uſes; ſuch as the ſaliva, ſweat, bile, the pancreatic juice, lymph, the ſemen, nails, the hair, the horns and hoofs of animals.

Alchemiſts, who have ſought every where for their *great work*, as they called it, have particularly operated much on the excrements of men and other animals; but philoſophical chemiſtry has acquired no knowledge from all theſe alchemical labours, from the obſcurity with which their authors have deſcribed them The philoſophic chemiſts have not much examined animal excrements. Of theſe, Homberg is the only one who has particularly analyſed and examined human ordure; and this was done to ſatisfy an alchemical project of one of his friends, who pretended that from this matter a white oil could be obtained, without ſmell, and capable of fixing mercury into ſilver. The oil was found by Homberg, but mercury was not fixed by it.

The labours of this able chemiſt were not, however, uſeleſs, like thoſe of the alchemiſts; becauſe he has clearly related the experiments he made on this matter, in the Memoirs of the Academy of Sciences. Theſe experiments are curious, and teach ſeveral eſſential things concerning the nature of excrements. The reſult of theſe excrements is as follows: Freſh human feces being diſtilled to dryneſs in a water bath, furniſh a clear, watery, inſipid liquor, of a diſagreeable ſmell, but which contains no volatile alkali; which is a proof that this matter, although nearly in a putrefactive ſtate, is not however putrefied; for all ſubſtances really putrid furniſh with this degree of heat a manifeſt volatile alkali*. The dry reſiduum of the foregoing experiment, being diſtilled in a retort with a graduated fire, furniſhes a volatile alkaline ſpirit and ſalt, a fetid oil and leaves a reſiduous coal. Theſe are the ſame ſubſtances which are obtained from all animal matters.

Human feces, diluted and lixiviated in water, furniſh by filtration and evaporation of the water an oily ſalt of a nitrous nature, which deflagrates like nitre upon ardent coals, and which inflames in cloſe veſſels when heated to a certain degree. This ſame matter yielded to Homberg, who treated it by a complete fermentation or putrefaction, excited by a digeſtion during 40 days in a gentle water-bath heat, and who afterwards diſtilled it, an oil without colour, and without bad ſmell, and ſuch as he endeavoured to find; but which did not, as we ſaid before, fix mercury into ſilver.

EXCRESCENCE, in ſurgery, denotes every preternatural tumour which ariſes from the ſkin, either in the form of a wart or tubercle. If they are born with a perſon, as they frequently are, they are called *nævi materni*, or marks from the mother; but if the tumour is large, ſo as to depend from the ſkin, like a fleſhy maſs, it is then called a *ſarcoma*. See SURGERY.

EXCRETION, or SECRETION, in medicine, a ſeparation of ſome fluid, mixed with the blood, by means of the glands. Excretions, by which we mean thoſe that evacuate ſuperfluous and heterogeneous humours, purify the maſs of blood: the humours which are generated in the blood are excreted by the glands, and are replaced by a ſufficient quantity of aliment.

EXCRETORY, in anatomy, a term applied to certain little ducts or veſſels, deſtined for the reception of a fluid, ſecreted in certain glandules, and other viſcera, for the excretion of it in the appropriated places.

EXCUBIÆ, in antiquity, the watches and guards kept in the day by the Roman ſoldiers. They are contradiſtinguiſhed from the *vigiliæ* which are kept in the night. The *excubiæ* were placed either at the gates and entrenchments or in the camp; for the latter there was allowed a whole *manipulus* to attend before the *prætorium*, and four ſoldiers to the tent of every *tribune*. The *excubiæ* at the gates of the camp, and at the entrenchments, were properly called *ſtationes* One company of foot and one troop of horſe were aſſigned to each of the four gates every day. To deſert their poſt, or abandon their corps of guards, was on unpardonable crime.

The *triarii*, as the moſt honourable order of ſoldiers, were excuſed from the ordinary watches; yet being placed oppoſite to the *equites*, they were obliged to have an eye over them.

LETTERS *of* EXCULPATION, in Scots law, a writ or ſummons iſſued by authority of the court of judicatory, at the inſtance of a pannel, for citing witneſſes to prove his defences, or his objections to any of the jury or witneſſes cited againſt him.

EXCUSATI, in church hiſtory, a term uſed to denote ſlaves, who flying to any church for ſanctuary, were excuſed and pardoned by their maſters; but theſe were obliged to take an oath to that purpoſe before they could have them again; and, if they broke the oath, they were puniſhed and fined as perſons guilty of perjury.

EXEAT, in church-diſcipline, a Latin term, uſed for a permiſſion which a biſhop grants a prieſt to go out of his dioceſe; or an abbot to a religious to go out of his monaſtery.

The word is alſo uſed in ſeveral great ſchools for leave given a ſcholar or ſtudent to go out. His maſter has given him an exeat.

EXECRATION, in antiquity, a kind of puniſhment, conſiſting of direful curſes, and marks of infamy; ſuch was that uſed againſt Philip king of Macedon by the Athenians. A general aſſembly of the people being called, they made a decree, that all the ſtatues and images of that king, and of all his anceſtors, ſhould be demoliſhed, and their very name razed; that all the feſtivals, ſacred rites, prieſts, and whatever elſe had been inſtituted in honour of him, ſhould be profaned; that the very places where there had been any monument or inſcription to his honour, ſhould be deteſtable; that nothing ſhould be ſet up, or dedicated in them, which could be done in clean places; and, laſtly, that the prieſts, as often as they prayed for the Athenian people, allies, armies, and fleets, ſhould as many times deteſt and execrate Philip, his children, kingdom, land and ſea forces and the whole race and name of the Macedonians.

At the taking and demoliſhing of cities, it was uſual amongſt the Jews, Greeks, and Romans, to pronounce curſes upon, and load with direful execrations, the rebuilders of them.

EXECUTION, in a general ſenſe the act of accompliſhing, finiſhing, or atchieving any thing.

EXECUTION, in law, the completing or finiſhing ſome act, as of judgment, deed, &c. and it uſually ſignifies the obtaining poſſeſſion of any thing recovered by judgment of law.

Sir Edward Coke obſerves, that there are two ſorts of executions; the one final; and the other a quouſque, that tends to an end. An execution final, is that which makes money of the defendant's goods; or extends to his lands, and delivers them to the plaintiff, who accepts the ſame in ſatisfaction; and this is the end of the ſuit, and the whole that the king's writ requires to be done. The writ of execution with a quouſque, tho' it tends to an end, yet is not final, as in the caſe of a *capias ad ſatisfac*, where the defendant's body is to be taken, in order that the plaintiff may be ſatisfied for his debt. See CAPIAS.

Executions are either in perſonal, real, or mixed actions. In a perſonal action, the execution may be made

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* See *Putrefaction*.

three ways, *viz.* by the writ of *capias ad ſatisfaciendum*, againſt the body of the defendant; *fieri facias*, againſt his goods; or *elegit*, againſt his lands. See *Fieri Facias* and Elegit.

In a real and mixed action, the execution is by writ of *habere facias ſaſinam*, and *habere poſſeſſionem**. Writs of execution bind the property of goods only from the time of delivery of the writ to the ſheriff; but the land is bound from the day of the judgment obtained: and here the ſale of any goods for valuable conſideration, after a judgment, and before the execution awarded, will be good. It is otherwiſe as to lands, of which execution may be made, even on a purchaſe after the judgment, though the defendant ſell ſuch land before execution. Likewiſe, ſheriffs may deliver in execution all the lands whereof others ſhall be ſeiſed in truſt for him, againſt whom execution is had on a judgment, &c.

* See *Habere*.

When any judgment is ſigned, the execution may be taken out immediately thereon; but if it be not iſſued within a year and a day after, where there is no fault in the defendant, as in the caſe of an injunction, writ of error, &c. there muſt be a *ſcire facias*, to revive the judgment; though, if the plaintiff ſues out any writ of execution within the year, he may continue it after the year is expired. After judgment againſt the defendant, in an action wherein ſpecial bail is given, the plaintiff is at liberty to have execution againſt ſuch defendant, or againſt his bail: but this is underſtood where the defendant does not render himſelf, according to law, in ſafeguard of the bail: and execution may not be regularly ſued forth againſt a bail, till a default is returned againſt the principal: alſo if the plaintiff takes the bail, he ſhall never take the principal. It is held that an execution may be executed after the death of the defendant; for his executor, being privy thereto, is liable as well as the teſtator. The executor is an entire thing, ſo that he who begins muſt end it: therefore, a new ſheriff may diſtrain an old one, to ſell the goods ſeized on a diſtringas, and to bring the money into court.

Execution, in criminal caſes, the completion of human puniſhment. This follows judgment†; and muſt in all caſes, capital as well as otherwiſe, be performed by the legal officer, the ſheriff or his deputy; whoſe warrant for ſo doing was anciently by precept under the hand and ſeal of the judge, as it is ſtill practiſed in the court of the lord high ſteward, upon the execution of a peer: though, in the court of the peers in parliament, it is done by writ from the king. Afterwards it was eſtabliſhed, that in caſe of life, the judge may command execution to be done without any writ. And now the uſage is, for the judge to ſign the kalendar or liſt of all the priſoners names, with their ſeparate judgments in the margin, which is left with the ſheriff. As, for a capital felony, it is written oppoſite the priſoner's name, "let him be hanged by the neck; formerly, in the days of Latin and abbreviation, "*ſuſ. per coll.*" for "*ſuſpendatur per collum.*" And this is the only warrant that the ſheriff has for ſo material an act as taking away the life of another. It may certainly afford matter of ſpeculation, that in civil cauſes there ſhould be ſuch a variety of writs of execution to recover a trifling debt, iſſued in the king's name, and under the ſeal of the court, without which the ſheriff cannot legally ſtir one ſtep; and yet that the execution of a man, the moſt important and terrible taſk of any, ſhould depend upon a marginal note.

† See *Judgement*.

Blackſt. Commen.

The ſheriff, upon receipt of his warrant, is to do execution within a convenient time; which in the country is alſo left at large. In London, indeed, a more ſolemn and becoming exactneſs is uſed, both as to the warrant of execution and the time of executing thereof: for the recorder, after reporting to the king in perſon the caſe of the ſeveral priſoners, and receiving his royal pleaſure, that the law muſt take its courſe, iſſues his warrant to the ſheriffs, directing them to do execution on the day and at the place aſſigned. And in the court of king's bench, if the priſoner be tried at the bar, or brought there by *habeas corpus*, a rule is made for his execution; either ſpecifying the time and place, or leaving it to the diſcretion of the ſheriff. And, throughout the kingdom, by ſtatute 25 Geo. II. c. 37. it is enacted that, in caſe of murder, the judge ſhall in his ſentence direct execution to be performed on the next day but one after ſentence paſſed. But, otherwiſe, the time and place of execution are by law no part of the judgment. It has been well obſerved, that it is of great importance that the puniſhment ſhould follow the crime as early as poſſible; that the proſpect of gratification or advantage, which tempts a man to commit the crime, ſhould inſtantly awake the attendant idea of puniſhment. Delay of execution ſerves only to ſeparate theſe ideas; and then the execution itſelf affects the minds of the ſpectators rather as a terrible ſight, than as the neceſſary conſequence of tranſgreſſion.

The ſheriff cannot alter the manner of the execution, by ſubſtituting one death for another, without being guilty of felony himſelf. It is held alſo by Sir Edward Coke and Sir Matthew Hale, that even the king cannot change the puniſhment of the law, by altering the hanging or burning into beheading; though, when beheading is part of the ſentence, the king may remit the reſt. And, notwithſtanding ſome examples to the contrary, Sir Edward Coke ſtoutly maintains, that *judicandum eſt legibus, non exemplis.* But others have thought, and more juſtly, that this prerogative, being founded in mercy, and immemorially exerciſed by the crown, is part of the common law. For hitherto, in every inſtance, all theſe exchanges have been for more merciful kinds of death; and how far this may alſo fall within the king's power of granting conditional pardons (*viz.* by remitting a ſevere kind of death, on condition that the criminal ſubmits to a milder) is a matter that may bear conſideration. It is obſervable, that when Lord Stafford was executed for the popiſh plot in the reign of King Charles II. the then ſheriffs of London, having received the king's writ for beheading him, petitioned the Houſe of Lords, for a command or order from their lordſhips, how the ſaid judgment ſhould be executed: for, he being proſecuted by impeachment, they entertained a notion (which is ſaid to have been countenanced by Lord Ruſſel), that the king could not pardon any part of the ſentence. The lords reſolved, that the ſcruples of the ſheriffs were unneceſſary; and declared, that the king's writ ought to be obeyed. Diſappointed of raiſing a flame in that aſſembly, they immediately ſignified to the Houſe of Commons by one of their members, that they were not ſatisfied as to the power of the ſaid writ. That houſe took two days to conſider of it; and then ſullenly reſolved, that the houſe was *content* that the ſheriff do execute Lord Stafford by ſevering his head from his body. It is farther related, that when afterwards the ſame Lord Ruſſel was condemned for high treaſon upon indictment, the king, while he remitted the ignominious part of the ſentence, obſerved, "that his Lordſhip would now find he was poſſeſſed of that prerogative, which in the caſe of Lord Stafford he had denied him." One can hardly determine (at this diſtance from thoſe turbulent times), which moſt to diſapprove of, the indecent and ſanguinary zeal of the ſubject, or the cool and cruel ſarcaſm of the ſovereign.

To conclude: it is clear, that if, upon judgment to be hanged by the neck till he is dead, the criminal be not thoroughly killed, but revives, the ſheriff muſt hang him again. For the former hanging was no execution of the ſentence; and, if a falſe tenderneſs were to be indulged in ſuch caſes, a multitude of colluſions might enſue. Nay, even while abjurations were in force, ſuch a criminal, ſo reviving, was not allowed to take ſanctuary and abjure the realm; but his fleeing to ſanctuary was held an eſcape in the officer.

Execution, in the law of Scotland. See Law. Part. III. n° clxxxv. 52. clxxxvi. 15.

Execution, in the French muſic, is uſed to denote the manner of ſinging, or of the performance of a ſong. "As to the manner of ſinging, called in France *execution*, no nation may, with any probability, diſpute it with the French. If the French, by their commerce with the Italians, have gained a bolder compoſition, the Italians have made their advantage of the French, in learning of them a more polite, moving, and exquiſite execution." St Evremond.

EXECUTIVE power. The ſupreme executive power of Great Britain is veſted by their laws in a ſingle perſon, the king or queen for the time being. See the article King.

The executive power, in this eſtate, hath a right to a negative in parliament, *i. e.* to refuſe aſſent to any acts offered; otherwiſe the other two branches of legiſlative power would, or might, become deſpotic.

EXECUTOR, a perſon nominated by a teſtator, to take care to ſee his will and teſtament executed or performed, and his effects diſpoſed of according to the tenor of the will. See Law.

Executor, in Scots law, ſignifies either the perſon intitled to ſucceed to the moveable eſtate of one deceaſed, or who by law or ſpecial appointment is intruſted with the adminiſtration of it.

EXECUTORY, in law, where an eſtate in fee, that is made by deed or fine, is to be executed afterwards by entry, livery, or writ. Leaſes for years, annuities, conditions, &c. are termed *inheritances executory*.

EXECUTRY, in Scots law, is the moveable eſtate falling to the executor. Under executry, or moveables, is comprehended every thing that moves itſelf, or can be moved; ſuch as corns, cattle, furniture, ready money, &c.

EXEDRÆ, in antiquity, denoted halls with many ſeats, where the philoſophers, rhetoricians, and men of learning, met for diſcourſe and diſputation. The words occurs in eccleſiaſtical writers as a general name for ſuch buildings as were diſtinct from the main body of the churches, and yet within the limits of the church taken in its largeſt ſenſe. Among the exedræ the chief was the Baptistry.

EXEGESIS, a diſcourſe by way of explanation or comment upon any ſubject. In the Scotch univerſities, there is an exerciſe among the ſtudents in divinity, called an *exegeſis*, in which a queſtion is ſtated by the reſpondent, who is then oppoſed by two or three other ſtudents in their turns; during which time the profeſſor moderates, and ſolves the difficulties which the reſpondent cannot overcome.

EXEGETES, (formed of εξηγιομαι "I explain,") among the Athenians, perſons learned in the laws, whom the judges uſed to conſult in capital cauſes.

EXEGETICA, in algebra, the art of finding, either in numbers or lines, the roots of the equation of a problem, according as the problem is either numerical or geometrical.

EXEMPLAR, a model, or original, to be imitated or copied. See Model.

Exemplar alſo denotes the idea, or image, conceived or formed in the mind of the artiſt, whereby he conducts his work. Such is the idea of Cæſar, which a painter has in his mind when he goes to make a picture of Cæſar.

EXEMPLIFICATION *of letters Patent*, denotes an exemplar, or copy of letters patent, made from the inrolment thereof, and ſealed with the great ſeal of England. Such exemplifications are as effectual to be ſhowed, or pleaded, as the letters patent themſelves.

EXEMPTION, in law, a privilege to be free from ſome ſervice or appearance: thus, barons and peers of Britain are, on account of their dignity exempted from being ſworn upon inqueſts; and knights, clergymen, and others, from appearing at the ſheriff's turn. Perſons of 70 years of age, apothecaries, &c. are alſo by law exempted from ſerving on juries; and juſtices of the peace, attorneys, &c. from pariſh offices.

EXERCISE, among phyſicians, ſuch an agitation of the body as produces ſalutary effects in the animal economy.

Exerciſe may be ſaid to be either active or paſſive. The active is walking, hunting, dancing, playing at bowls, and the like; as alſo ſpeaking, and other labour of the body and mind. The paſſive is riding in a coach, on horſeback, or in any other manner. Exerciſe may be continued to a beginning of wearineſs, and ought to be uſed before dinner in a pure light air; for which reaſon, journeys, and going into the country, contribute greatly to preſerve and re-eſtabliſh health.

Exerciſe increaſes the circulation of the blood, attenuates and divides the fluids, and promotes a regular perſpiration, as well as a due ſecretion of all the humours; for it accelerates the animal ſpirits, and facilitates their diſtribution into all the fibres of the body, ſtrengthens the parts, creates an appetite, and helps digeſtion. Whence it ariſes, that thoſe who accuſtom themſelves to exerciſe are generally very robuſt, and ſeldom ſubject to diſeaſes.

Boerhaave recommends bodily exerciſe in diſeaſes of a weak and lax fibre. By riding on horſeback, ſays his commentator, the pendulous viſcera of the abdomen are ſhaken every moment, and gently rubbed as it were one againſt another, while in the mean time the pure air acts on the lungs with greater force. But it is to be obſerved that a weak man ſhould not ride with a full ſtomach, but either before dinner, or after the digeſtion is near finiſhed; for when the ſtomach is diſtended, weak people do not bear theſe concuſſions of the horſe without difficulty; but when the primæ viæ are near empty, the remaining feces are diſcharged by this concuſſion. Sailing in a ſhip is alſo an exerciſe of great uſe to weak people. If the veſſel moves with an even motion by increaſing perſpiration it uſually excites a wonderful alacrity, creates an appetite, and promotes digeſtion. Theſe exerciſes are more eſpecially ſerviceable to weak people; but, in order to ſtrengthen the body by muſcular motion, running, and bodily exerciſes are to be uſed. In theſe we ſhould begin with the moſt gentle, ſuch as walking, and increaſe it by degrees till we come to running. Thoſe exerciſes of the body are more eſpecially ſerviceable which give delight to the mind at the ſame time, as tennis, fencing, &c.; for which reaſon, the wiſdom of antiquity appointed rewards for thoſe who excelled in theſe gymnaſtic exerciſes, that by this means the bodies of their youth might be hardened for warlike toils.

As nothing is more conducive to health than moderate exerciſe, ſo violent exerciſe diſſipates the ſpirits, weakens the body, deſtroys the elaſticity of the fibres, and exhauſts the fluid parts of the blood. No wonder, then, that acute and mortal fevers often ariſe from too violent exerciſe of the body; for the motion of the venous blood towards the heart being quickened by the contraction of the muſcles, and the veins being thus depleted, the arteries more eaſily propel their contained humours through the ſmalleſt extremities into the now leſs reſiſting veins; and therefore the velocity of the circulation will be increaſed through all the veſſels. But this cannot be performed without applying the humours oftener, or in a greater quantity, to the ſecretory organs in the ſame time, whence the more fluid parts of the blood will be diſſipated, and what remains will be inſpiſſated; and by the greater action of the veſſels upon their contained fluids, and of the reacting fluids upon the veſſels, the blood acquires an inflammatory denſity. Add to this, that by the violent attrition of the ſolids and fluids, together with the heat thence ariſing, all the humours will incline to a greater acrimony, and the ſalts and oils of the blood will become more acrid and volatile. Hence, ſays Boerhaave, thoſe fevers which ariſe from too much exerciſe or motion, are cured by reſt of body and mind, with ſuch aliments and medicines as moiſten, dilute, and ſoften or allay acrimony.

The exerciſe of a ſoldier in camp, conſidered as conducive to health, Dr Pringle diſtinguiſhes into three heads; the firſt relating to his duty, the ſecond to his living more commodiouſly, and the third his diverſions. The firſt, conſiſting chiefly in the exerciſe of his arms will be no leſs the means of preſerving health than of making him expert in his duty: and frequent returns of this, early, and before the ſun grows hot, will be made more advantageous than repeating it ſeldom, and ſtaying out long at a time; for a camp affording little convenience for refreſhment, all unneceſſary fatigue is to be avoided. As to the ſecond article, cutting boughs for ſhading the tents, making trenches round them for carrying off the water, airing the ſtraw, cleaning their clothes and accoutrements, and aſſiſting in the buſineſs of the meſs, ought to be no diſagreeable exerciſe to the men for ſome part of the day. Laſtly, as to diverſions, the men muſt be encouraged to them either by the example of their officers, or by ſmall premiums to thoſe who ſhall excel in any kind of ſports as ſhall be judged moſt conducive to health: but herein great caution is neceſſary, not to allow them to fatigue themſelves too much, eſpecially in hot weather or ſickly times; but above all, that their clothes be kept dry, wet clothes being the moſt frequent cauſes of camp-diſeaſes.

Exercise, in military affairs, is the ranging a body of ſoldiers in form of battle, and making them perform the ſeveral motions and military evolutions with different management of their arms, in order to make them expert therein. See alſo Words *of Command*.

Exercise, in the Britiſh navy, is the preparatory practice of managing the artillery and ſmall arms, in order to make the ſhip's crew perfectly ſkilled therein, ſo as to direct its execution ſucceſsfully in the time of battle.

The exerciſe of the great gun was, till lately, very complicated, and abounding with ſuperfluities, in the navies of every nation. The following method was then introduced into the Britiſh navy by an officer of diſtinguiſhed abilities.

1ſt, Silence.
2d, Caſt looſe your guns.
3d, Level your guns.
4th, Take out your tompions.
5th, Run out your guns.
6th, Prime.
7th, Point your guns.
8th, Fire.
9th, Spunge your guns.
10th, Load with cartridge.
11th, Shot your guns.
12th, Put in your tompions.
13th, Houſe your guns.
14th, Secure your guns.

Upon beat-to-arms (every body having immediately repaired to their quarters) the midſhipman commanding a number of guns, is to ſee that they are not without every neceſſary article, as (at every gun) a ſpunge, powder-horn, with its priming wires, and a ſufficient quantity of powder, crow, hand-ſpike, bed, quoin, train-tackle, &c, ſending without delay for a ſupply of any thing that may be amiſſing; and for the greater certainty of not overlooking any deficiency, he is to give ſtrict orders to each captain under him, to make the like examination at his reſpective gun, and to take care that every requiſite is in a ſerviceable condition, which he is to report accordingly. And (beſides the other advantages of this regulation) for the ſtill more certain and ſpeedy account being taken upon theſe occaſions, the midſhipman is to give each man his charge at quarters (as expreſſed in the form of the monthly report), who is to ſearch for his particular implements, and, not finding them, is immediately to acquaint his captain, that, upon his report to the midſhipman, they may be replaced.

The man who takes care of the powder is to place himſelf on the oppoſite ſide of the deck from that where we engage, except when fighting both ſides at once, when he is to be amid-ſhips. He is not to ſuffer any other man to take a cartridge from him but he who is appointed to ſerve the gun with that article, either in time of a real engagement or at exerciſe.

Lanthorns are not to be brought to quarters in the night, until the midſhipman gives his orders for ſo doing to the perſon he charges with that article. Every thing being in its place, and not the leaſt lumber in the way of the guns, the exerciſe begins with,

1. "Silence." At this word every one is to obſerve a ſilent attention to the officers.

2. "Caſt looſe your guns." The muzzle laſhing is to be taken off from the guns, and (being coiled up in a ſmall compaſs) is to be made faſt to the eye-bolt above the port. The laſhing-tackles at the ſame time to be caſt looſe, and middle of the breeching ſeized to the thimble of the pomillion. The ſpunge to be taken down, and with the crow, hand-ſpike, &c. laid upon the deck by the gun. N. B. When prepared for engaging an enemy, the ſeizing within the clinch of the breeching is to be cut, that the gun may come ſufficiently within-board for loading, and that the force of the recoil may be more ſpent before it acts upon the breeching.

3. "Level your guns." The breech of your metal is to be raiſed ſo as to admit the foot of the bed's being placed upon the axle-tree of the carriage, with the quoin upon the bed, both their ends being even one with the other. N. B. When levelled for firing, the bed is to be laſhed to the bolt which ſupports the inner end of it, that it may not be thrown out of its place by the violence of the gun's motion when hot with frequent diſcharges.

4. "Take out your tompions." The tompion is to be taken out of the gun's mouth, and left hanging by its laniard.

5. "Run out your guns." With the the tackles hooked to the upper bolts of the carriage, the gun is to be bowſed out as cloſe as poſſible, without the aſſiſtance of crows or hand-ſpikes; taking care at the ſame time to keep the breeching clear of the trunks, by hauling it through the rings; it is then to be bent ſo as to run clear when the gun is fired. When the gun is out, the tackle-falls are to be laid along-ſide the carriages in neat fakes, that, when the gun by recoiling overhauls them, they may not be ſubject to get foul, as they would if in a common coil.

6. "Prime." If the cartridge is to be pierced with the priming-wire, and the vent filled with powder, the pan alſo is to be filled; and the flat ſpace, having a ſcore through it at the end of the pan, is to be covered, and this part of the priming is to be bruiſed with the round part of the horn. The apron is to be laid over, and the horn hung up out of danger from the flaſh of the priming.

7. "Point your guns." At this command the gun is, in the firſt place, to be elevated to the height of the object, by means of the ſide-ſights; and then the perſon pointing is to direct his fire by the upper ſight, having a crow on one ſide and a hand-ſpike on the other, to heave the gun by his direction till he catches the object.

N. B. The men who heave the gun for pointing are to ſtand between the ſhip's ſide and their crows or hand-ſpikes, to eſcape the injury they might otherwiſe receive from their being ſtruck againſt them, or ſplintered by a ſhot; and the man who attends the captain with the match is to bring it at the word, "Point your guns," and kneeling upon one knee oppoſite the train-truck of the carriage, and at ſuch a diſtance as to be able to touch the priming, is to turn his head from the gun, and keep blowing gently upon the lighted match to keep it clear from aſhes. And as the miſſing of an enemy in action, by neglect or want of coolneſs, is moſt inexcuſable, it is particularly recommended to have the people thoroughly inſtructed in pointing well, and taught to know the ill conſequences of not taking proper means to hit their mark; wherefore they ſhould be made to elevate their guns to the utmoſt nicety, and then to point with the ſame exactneſs, having caught the object through the upper ſight. At the word,

"Fire." The match is inſtantly to be put to the bruiſed part of the priming; and when the gun is diſcharged, the vent is to be cloſed, in order to ſmother any ſpark of fire that may remain in the chamber of the gun; and the man who ſpunges is immediately to place himſelf by the muzzle of the gun in readineſs; when, at the next word,

9. "Spunge your gun." The ſpunge is to be rammed down to the bottom of the chamber, and then twiſted round, to extinguiſh effectually any remains of fire; and, when drawn out, to be ſtruck againſt the out-ſide of the muzzle, to ſhake off any ſparks or ſcraps of the cartridge that may have come out with it; and next, its end is to be ſhifted ready for loading; and while this is doing, the man appointed to provide a cartridge is to go to the box, and by the time the ſpunge is out of the gun, he is to have it ready; and at the word,

10. "Load with cartridge." The cartridge (with the bottom-end firſt, ſeam downwards, and a wad after it) it is to be put into the gun, and thruſt a little way within the mouth, when the rammer is to be entered: the cartridge is then to be forcibly rammed down; and the captain at the ſame time is to keep his priming-wire in the vent, and, feeling the cartridge, is to give the word *home*, when the rammer is to be drawn, and not before. While this is doing, the man appointed to provide a ſhot is to provide one (or two, according to the order at that time) ready at the muzzle, with a wad likewiſe; and when the rammer is drawn, at the word,

11. "Shot your guns." The ſhot and wad upon it are to be put into the gun, and thruſt a little way down when the rammer is to be entered as before. The ſhot and wad are to be rammed down to the cartridge, and there have a couple of forcible ſtrokes; when the rammer is to be drawn, and laid out of the way of the guns and tackles, if the exerciſe or action is continued; but if it is over, the ſpunge is to be ſecured in the place it is at all times kept in.

12. "Put in your tompions." The tompions to be put into the muzzle of the cannon.

13. "Houſe your guns." The ſeizing is to be put on again upon the clinched end of the breeching, leaving it no ſlacker than to admit of the guns being houſed with eaſe. The quoin is to be taken from under the breech of the gun, and the bed, ſtill reſting

upon the bolt, within the carriage, thruſt under, till the foot of it falls off the axle-tree, leaving it to reſt upon the end which projects out from the foot. The metal is to be let down upon this. The gun is to be placed exactly ſquare; and the muzzle is to be cloſe to the wood, in its proper place for paſſing the muzzle-laſhings.

14. "Secure your guns." The muzzle-laſhings muſt firſt be made ſecure, and then with one tackle (having all its parts equally taught with the breeching) the gun is to be laſhed. The other tackle is be bowſed taught, and by itſelf made faſt, that it may be ready to caſt off for laſhing a ſecond breeching. N. B. Care muſt be taken to hook the firſt tackle to the upper bolt of the carriage, that it may not otherwiſe obſtruct the reeving of the ſecond breeching, and to give the greater length to the end part of the fall. No pains muſt be ſpared in bowſing the laſhing very taught, that the gun may have the leaſt play that is poſſible, as their being looſe may be productive of very dangerous conſequences. The quoin, crow, and hand-ſpike are to be put under the gun, the powder-horn hung up in its place, &c.

Being engaged at any time when there is a large ſwell, a rough ſea, or in ſqually weather, &c. as the ſhip may be liable to be ſuddenly much heeled, the port-tackle fall is to be kept clear, and (whenever the working of the gun will admit of it) the man charged with that office is to keep it in his hand; at the ſame time the muzzle-laſhing is to be kept faſt to the ring of the port, and being hauled taught, is to be faſtened to the eye-bolt over the port-hole, ſo as to be out of the gun's way in firing, in order to haul it in at any time of danger.

This precaution is not to be omitted, when engaging to the windward, any more than when to the leeward, thoſe ſituations being very ſubject to alter at too ſhort a warning.

A train-tackle is always to be made uſe of with the lee-guns; and the man ſtationed to attend it is to be very careful in preventing the guns running out at an improper time.

EXERCISE, may alſo be applied with propriety to the forming our fleets into orders of ſailing, lines of battle, &c. an art which the French have termed *evolutions* or *tactiques*. In this ſenſe exerciſe may be defined, the execution of the movements which the different orders and diſpoſitions of fleets occaſionally require, and which the ſeveral ſhips are directed to perform by means of ſignals. See TACTICS.

EXERCISES, are alſo underſtood of what young gentlemen learn in the academies and riding-ſchools, ſuch as fencing, drawing, riding the great horſe, &c.

How uſeful, how agreeable ſoever, ſtudy may be to the mind, it is very far from being equally ſalutary to the body. Every one obſerves, that the Creator has formed an intimate connection between the body and the mind; a perpetual action and reaction, by which the body inſtantly feels the diſorders of the mind, and the mind thoſe of the body. The delicate ſprings of our frail machines loſe their activity and become enervated, and the veſſels are choaked by obſtructions when we totally deſiſt from exerciſe, and the conſequences neceſſarily affect the brain: a more ſtudious and ſedentary life is therefore equally prejudicial to the body and the mind. The limbs likewiſe become ſtiff; we contract an aukward conſtrained manner; a certain diſguſtful air attends all our actions, and we are very near being as diſagreeable to ourſelves as to others. An inclination to ſtudy is highly commendable; but it ought not, however, to inſpire us with an averſion to ſociety. The natural lot of man is to live among his fellows: and whatever may be the condition of our birth, or our ſituation in life, there are a thouſand occaſions where a man muſt naturally deſire to render himſelf agreeable; to be active and adroit; to dance with a grace; to command the fiery ſteed; to defend himſelf againſt a brutal enemy; to preſerve his life by dexterity; as by leaping, ſwimming, &c. Many rational cauſes have therefore given riſe to the practice of particular exerciſes; and the moſt ſagacious and benevolent legiſlators have inſtituted, in their academies and univerſities, proper methods of enabling youth, who devote themſelves to ſtudy, to become expert alſo in laudable exerciſes.

EXERCITOR, in Scots law, he who employs a ſhip in trade, whether he be owner, or only freights her from the owner.

EXERGESIA. See ORATORY, n° 90.

EXERGUM, among antiquarians, a little ſpace around or without the figures of a medal, left for the inſcription, cipher, device, date, &c.

EXETER, the capital city of Devonſhire, ſituated on the river Ex, ten miles north of the Britiſh channel: W. Long. 3. 40. N. Lat. 50. 44. Anciently the name of this city was *Iſex*, and *Iſia Dumnoniorum*. The preſent name is a contraction of *Exceſter*, that is, a city upon the Ex. It is large, populous, and wealthy, with gates, walls, and ſuburbs: the circumference of the whole is about three miles. It is the ſee of a biſhop, transferred hither from Crediton, by Edward the Confeſſor; and is one of the principal cities in the kingdom for its buildings, wealth, and number of its inhabitants. It had ſix gates, beſides many turrets, ſeveral of which are now pulled down. It had formerly ſo many convents, that it was called *Monktown*, till king Athelſtan changed its name to Exeter, about the year 940; at which time he alſo fortified the city (which had before been only incloſed with a ditch and a fence of timber) with circular walls, embattlements, towers, and turrets of ſquared ſtone, encircling the whole, except the weſtern ſide, with a deep moat. Beſides chapels and 5 large meeting-houſes, there are now 15 churches within the walls, and 4 without. St Peter's, the cathedral, is a magnificent pile; though little now remains of the ancient fabric of the church, except that part which is called *Our Lady's Chapel*. It has a ring of 12 bells, reckoned the largeſt ring of the largeſt bells in England; as is alſo its organ, whoſe largeſt pipes are 15 inches in diameter. In 1763 the cathedral was repaired, beautified, and new paved; when, in removing the old pavement, was found the leaden coffin of biſhop Bitton, who died in 1307; the top of which being decayed, afforded an opportunity of viewing the ſkeleton lying in its proper form: near the bones of the finger was found a ſaphire ring ſet in gold; the ſtone conſiderably large, but of no great value, on account of

Exeter.

of ſeveral flaws in it Near this ſtood a ſmall neat chalice and patten of ſilver gilt, but the damp had deſtroyed the greateſt part of the gilding. In the centre of the patten was engraved a hand, with the two forefingers extended in the attitude of benediction. The top of the crozier was alſo found, but totally decayed. A moſt beautiful modern painted glaſs window has been lately erected at the weſtern end of the cathedral, the eaſtern end having before a remarkable fine antique one. In the other windows there is much fine ancient painted glaſs. The altar is remarkable for its beautiful deſign and execution. On the left-hand ſide of it there yet exiſts the ſeat where Edward the Confeſſor and his queen ſat and inſtalled Leofricus his chancellor, the firſt biſhop of Exeter; and in the ſouth croſs aiſle is the monument of the ſame Leofricus, who died 1073, which at the time of his interment was a part of the church-yard, but by the enlarging of the church by his ſucceſſors became nearly the middle of the building. The grand weſtern end of the church is moſt magnificently adorned with the ſtatues of the patriarchs, &c. The chapter-houſe was built in 1439. The beautiful throne for the biſhop was conſtructed about 1466, and is ſaid to be grandeſt of the kind in Britain. The great north tower was completed in 1485, which contains a bell that weighs 12,500 pounds; and exceeds the great Tom of Lincoln by 2,500 pounds. This city has had divers charters granted, or confirmed, by moſt of the Engliſh kings; but it was made a mayor town in the reign of king John, and a county of itſelf by king Henry VIII. It is governed by a mayor, 24 aldermen, 4 bailiffs, a recorder, chamberlain, ſheriff, town-clerk, &c. They have a ſword-bearer, and four ſtewards, four ſerjeants at mace wearing gowns, and ſtaff-bearers in liveries with ſilver badges. It had anciently a mint; and in the reigns of king William III. and queen Anne, many pieces of ſilver money were coined here, which have the letter E under the buſt. Here are 12 or 13 incorporate city-companies. All pleas and civil cauſes are tried by the mayor, recorder, aldermen, and common-council; but criminal cauſes, and thoſe relating to the peace, are determined by eight aldermen, who are juſtices of the peace. Here are four principal ſtreets, all centring in the middle of the city, which is therefore called *Carfox*, from the old Norman word *Quatre voix*, i. e. the four ways. Near it is a conduit, lately removed from the centre to the ſide of the principal ſtreet which was firſt erected by William Duke, mayor of the city, in the reign of Edward IV. and there are others well ſupplied with water brought in pipes from the neighbourhood. There is an old caſtle in the north-eaſt part of the city, called *Rougemont*, from the red ſoil it ſtands on; from thence there is a pleaſant proſpect from the walls. It is ſuppoſed to have been built by the Weſt Saxon kings, and that they reſided here, as did afterwards the earls and dukes of Cornwall. This caſtle was remarkably ſtrong both by nature and art. The gate, which originally led into it, was walled up by order of William the Conqueror, in token of his having reduced it to his obedience after a very obſtinate reſiſtance; and cloſe by it an inferior gate was made in the wall, in which ſtate they both remain. The outward ſtone facing is kept in tolerable repair; but in the inſide, being but earth is gradually crumbled down. Here yet remains the ancient chapel, built in 1260, and kept in good repair, where prayers are read and a ſermon preached in ſeſſions weeks. The city itſelf is healthy, and pleaſantly ſituated on the ſides of a hill, having other hills to its N. W. and S. by which it is ſheltered from the force of ſtorms. The bank which ſuſtained the ditch that in a great part ſurrounded the caſtle, is planted and gravelled, and accommodated with ſeats, it being the place of reſort for walking for the inhabitants; and the ditch between it and the caſtle being filled up, is now thickly planted with elms, which form a delightful grove. The old palace is now entirely demoliſhed, and an elegant ſeſſions-houſe erected, where the aſſizes, quarter-ſeſſions, and county-courts are held. In the city and ſuburbs are priſons both for debtors and malefactors; a work-houſe, alms-houſes, and charity-ſchools; an hoſpital for the ſick and lame poor of the city and county, upon the model of the infirmaries of London and Weſtminſter; and two free grammar-ſchools. It has markets on Wedneſdays and Fridays; and four fairs in the year. Great trade is carried on here for ſerges, perpetuanas, long-ells, and other woollen goods, in which it is computed that at leaſt 600,000l. a-year is traded for; yet no markets were erected here for wooll, yarn, and kerſeys, till the 30th of Henry VIII. Before that time, the merchants drove a conſiderable trade to Spain and France: they were incorporated, in the reign of queen Mary I. by the name of the governor, conſuls, and ſociety of merchant adventurers, trading to France." Here is alſo a weekly ſerge market, the greateſt in England, next to the Brigg market at Leeds in Yorkſhire: it is ſaid that ſome weeks as many ſerges have been ſold here as amount to 80,000l. or 100,000l.; for beſides the vaſt quantiteis of their woollen goods ſhipped for Portugal, Spain, and Italy, the Dutch give large commiſſions for buying up ſerges, perpetuanas, &c. for Holland and Germany. It is particularly remarked of this city, that it is almoſt as full of gentry as of tradeſmen; and that more of its mayors and bailiffs have deſcended from, or given riſe to, good families, than in any other city of its bigneſs in the kingdom; for the great trade and flouriſhing ſtate of this city tempted gentlemen to ſettle their ſons in it, contrary to the practice of many of the inland as well as northern counties, where, according to the vain and ruinous notions of the Normans, trade was deſpiſed by the gentry as fit only for mechanics and the vulgar. The city was under the juriſdiction of the Romans, whoſe coins have been frequently dug up in and about it. After they left England, the Saxons drove the Britons out of it into Cornwall, and encompaſſed it with a ditch, beſides bulwarks. The Danes attacked and ſpoiled it in 875; and afterwards, in revenge of the general maſſacre of the Danes by the Engliſh, Swain, one of their kings, came hither with a great force, put the men to the ſword, raviſhed the women, maſſacred the children, burnt the city, and defaced the walls. A long time after this, juſt as it was reviving, William the Conqueror beſieged and took it; and it was again beſieged in the reign, of king Stephen and Edward IV. In the reigns of Henry VII. it was again beſieged by Perkin Warbeck, and battered furiouſly: but the citizens forced him to raiſe the ſiege; which ſo pleaſed the king, that he came hither, and preſented a cap of maintenance to the city, and gave the very ſword from his ſide to be borne always before the mayor. In the reign of Edward VI. in July 1544, it was ſmartly cannonaded by the rebels of Cornwall and Devon, who almoſt ſtarved it by breaking down its bridges, cutting off its water, and ſtopping up all paſſages: but it held out till the lord John Ruſſel came with a force and raiſed the ſiege on the 6th of Auguſt, which was then appointed as an anniverſary day of thankſgiving by the city, and is ſtill obſerved as ſuch. King Charles I.'s queen, to whom this city gave ſhelter in the civil wars, was here delivered of Henrietta, afterwards ducheſs of Orleans; whoſe picture is in its Guild-Hall, as are alſo General Monk's and George I.'s, &c. In the ſouth-eaſt quarter of the city was a houſe called *Bedford-houſe*, wherein the above queen was delivered of the princeſs. This having lately been taken down, an elegant circus is built on the ſpot, with a theatre adjoining it; and for the conveniency of the inhabitants, a paſſage has been made through the town-wall to Southern Hay, on which green ſtands the county hoſpital, already ſpoken of, beſides a conſiderable number of new builings. There are remains of ſeveral ancient ſtructures, which are daily giving way to modern erections; among the reſt, an old building, ſaid to have been a palace of king Athelſtan. The Guildhall is a ſpacious and convenient building, whoſe front or portico projects a great way into the ſtreet, and was firſt erected in 1330, to which its preſent front was rebuilt in 1593, and repaired in 1720. An arm of the ſea formerly flowed nearly up to the city's wall, till 1316, when Hugh Courtenay earl of Devon, in revenge for an affront, ruined the navigation, by conſtructing wears and dams in the river; but to remedy it, in 1439, an act of parliament paſſed for making a navigable canal, for the better conveyance of goods in barges to and from the city to Topſham. This was carried into execution in 1581, but not completed till 1675; nor was it after all found ſufficient, till the preſent haven was conſtructed in 1697, when it was rendered capable of bringing ſhips of 150 tons quite to the quay, conſtructed near the walls of the city. In ſhort, Exeter, by a conſtant adherence to its motto, *Semper fidelis*; has been applauded by all hiſtorians for its inviolable fidelity to its ſovereigns, whether they held their crown by hereditary or parliamentary right. The city ſends two members to parliament; and gives title of earl to the Cecils.—The ſee of Exeter was once one of the moſt wealthy in the kingdom; but its revenues were moſt ſhamefully waſted by biſhop Voyſey, who alienated its lands. What little he left was ſo much encumbered, that the ſee has never been able to recover its former grandeur; and ſo ſmall are its preſent revenues, that it has been found neceſſary for the biſhop to hold ſome other preferment for the better ſupport of his dignity and rank. This ſee hath yielded to the nation three lord chancellors, two lord treaſurers, one lord preſident of Wales, and one chancellor to the univerſity of Oxford. The dioceſe contains the entire counties of Devonſhire and Cornwall, wherein are 604 pariſhes, whereof 239 are impropriate. It hath four archdeacons, viz. of Cornwall, Exeter, Barnſtable, and Totneſs. The dioceſe was formerly valued in the king's books at L. 1556 : 14 : 6; but, ſince biſhop Voyſey's time, it is lowered to L. 500, and is computed to be worth annually L. 2700. The clergy's tenth is L. 1200 : 15 : 2½. To the cathedral belong a biſhop, a dean, four archdeacons, a chancellor, a treaſurer, a chantor, 24 prebendaries, and other inferior officers and ſervants.

EXFOLIATION, a term uſed by ſurgeons for the ſcaling of a bone, or its riſing and ſeparating into thin laminæ or ſcales.

EXHALATION, a general term for all effluvia or ſteams raiſed from the ſurface of the earth in form of vapour.

EXHAUSTIONS, in mathematics. Method of exhauſtions, is a way of proving the equality of two magnitudes, by a *reductio ad abſurdum*; ſhowing, that if one be ſuppoſed either greater or leſs than the other, there will ariſe a contradiction.

The method of exhauſtions was of frequent uſe among the ancient mathematicians; as, Euclid, Archimedes, &c. It is founded on what Euclid ſays in his tenth book; *viz.* that thoſe quantities whoſe difference is leſs than any aſſignable quantity, are equal; for if they were unequal, be the difference never ſo ſmall, yet it may be ſo multiplied, as to become greater than either of them; if not ſo, then it is really nothing. This he aſſumes in the proof of prop. 1. book x. which imports, that if, from the greater of two quantities, you take more than its half, and from the remainder more than its half, and ſo continually, there will, at length remain a quantity leſs than either of thoſe propoſed. On this foundation it is demonſtrated, that if a regular polygon of infinite ſides be inſcribed in, or circumſcribed about, a circle; the ſpace, which is the difference between the circle and the polygon, will, by degrees, be quite exhauſted, and the circle become equal to the polygon.

EXHEREDATION, in the civil law, with us ordinarily called *diſinheriting*, is the father's excluding his ſon from inheriting his eſtate.

There are 14 cauſes of exheredation expreſſed in Juſtinian's Novel; without ſome one of which cauſes, he decrees the exheredation null, and the teſtament inofficious, as the civilians call it. Indeed, by the ancient Roman law, the father might pronounce exheredation without any cauſe; but the rigour of this law was reſtrained and moderated by Juſtinian.

EXHIBIT, in law, is where a deed, or other writing, being produced in a chancery ſuit to be proved by witneſſes, the examiner, or commiſſioner appointed for the examination of any ſuch, certifies on the back of the deed or writing, that the ſame was ſhown to the witneſs at the time of his examination, and by him ſworn to.

EXHIBITION, in law, a producing, or ſhowing, of titles, authorities, and other proofs, of a matter in conteſt.

Anciently they uſed the phraſe, *exhibition* of a tragedy, comedy, or the like; but now we ſay *repreſentation* in lieu thereof.

Exhibition, in old writers, is uſed for an allowance of meat and drink, ſuch as was cuſtomary among the religious appropriators of churches, who uſually made it to the depending vicar. The benefactions ſettled for the maintaining of ſcholars in the univerſities, not depending on the foundation, are alſo called *exhibitions*.

EXHORTATION, in rhetoric, differs only from *ſuaſion*, in that the latter principally endeavours to convince the underſtanding, and the former to work on the affections.

EXHUMATION, of *ex* " out of," and *humus* " ground)," the act of digging up a body interred in holy ground, by the authority of the judge. In France, the exhumation of a dead body is ordered, upon proof that he was killed in a duel. By the French laws, a parſon has a right to demand the exhumation of the body of one of his pariſhioners, when interred out of the pariſh without his conſent.

EXIGENCE, or EXIGENCY, that which a thing requires, or which is expedient and ſuitable thereto.

EXIGENT, in law, a writ which lies where the defendant in a perſonal action cannot be found, nor any effects of his within the county, by which he may be attached or diſtrained.

EXIGENTERS, four officers in the court of common-pleas, who make all exigents and proclamations, in all actions where proceſs of outlawry lies. Writs of ſuperſedeas, as well as the prothonotaries, upon exigents, were likewiſe drawn up in their office.

EXILE. See BANISHMENT.

Among the Romans, the word *exilium* properly ſignified an interdiction or excluſion from water and fire; the neceſſary conſequence of which was, that the interdicted perſon muſt betake himſelf into ſome other country, ſince there was no living without fire and water.—Thus Cicero, *ad Herenn.* obſerves, that the form of the ſentence did not expreſs *exilium*, but only *aquæ & ignis interdictio*. The ſame author remarks, that exile was not properly a puniſhment, but a voluntarily flying or avoiding the puniſhment decreed: *Exilium non eſſe ſupplicium, ſed perfugium, partuſque ſupplicii.* He adds, that there was no crime among the Romans, as among other nations, puniſhed with exile; but exile was a reſource to which people flew voluntarily, in order to avoid chains, ignominy, ſtarving, &c.

The Athenians frequently ſent their generals and great men into exile, out of envy to their merits, or diſtruſt of their too great authority. See OSTRACISM.

EXISTENCE, that whereby any thing has an actual eſſence, or is ſaid to *be*. See the article METAPHYSICS.

EXIT, properly expreſſes the departure of a player from off the ſtage, when he has acted his part. The word is alſo uſed in a figurative ſenſe, to expreſs any kind of departure, even death.

EXITERIA, in antiquity, oblations or prayers to any of the Gods for a proſperous expedition or journey. There were alſo feaſts under this denomination, which were celebrated by the Greeks, with ſacrifices and prayers, when their generals undertook expeditions againſt any enemy.

EXOCOETUS, or the FLYING-FISH, in ichthyology, a genus belonging to the order of abdominales. The head is ſcaly, and it has no teeth; it has 10 radii in the branchioſtege membrane; the body is whitiſh, and the belly is angular: the pectoral fins, the inſtruments of flight, are very large. When purſued by any other fiſh, it raiſes itſelf from the water by means of theſe long fins, and flies in the air to a conſiderable diſtance, till the fins dry, and then it falls down into the water. It is a fiſh that ſeems to lead a moſt miſerable life. In its own element, it is perpetually haraſſed by the dorados and other fiſh of prey. If it endeavours to avoid them by having recourſe to the air, it either meets its fate from the gulls or the albatroſs, or is forced down again into the mouth of the inhabitants of the water, who, below, keep pace with its aerial excurſion. This fiſh is caught in the Mediterranean and ſome other ſeas. It is moſt common between the tropics, and there its enemies are more particularly numerous. In theſe climates the flying fiſhes ſpring out of the water by hundreds, to eſcape the rapacity of the dolphins, ſharks, &c. When flying, they have as formidable enemies to encounter with in that element, viz. the pelican, eagle, diomedea, &c. and frequently throw themſelves on board the ſhips to eſcape their purſuit. Their fleſh is ſaid to be palatable and nouriſhing food.

Plate CLXXXVII.

EXODIARY, in the ancient Roman tragedy, was the perſon who, after the drama or play was ended, ſung the EXODIUM.

EXODIUM, in the ancient Greek drama, one of the four parts or diviſions of tragedy, being ſo much of the piece as included the cataſtrophe and unravelling of the plot, and anſwering nearly to our fourth and fifth acts.

EXODIUM, among the Romans, conſiſted of certain humorous verſes rehearſed by the exodiary at the end of the Fabulæ Atellanæ.

EXODIUM, in the Septuagint, ſignifies the end or concluſion of a feaſt. Particularly it is uſed for the eighth day of the feaſt of tabernacles, which it is ſaid had a ſpecial view to the commemoration of the *exodus* or departure out of Egypt.

EXODUS, a canonical book of the Old Teſtament; being the ſecond of the pentateuch, or five books of Moſes.

It is ſo called from the Greek [*exodos*], the " going out" or departure of the children of Iſrael from the land of Egypt; the hiſtory of which is delivered in this book, together with the many miracles wrought on that occaſion.

EXOMPHALUS, in ſurgery, called alſo *omphalocele*, and *hernia umbilicalis*, is a preternatural tumor of the abdomen, at the navel, from a rupture or diſtenſion of the parts which inveſt that cavity.

EXORCISM, the expelling of devils from perſons poſſeſſed, by means of conjurations and prayers. The Jews made great pretences to this power. Joſephus tells ſeveral wonderful tales of the great ſucceſs of ſeveral exorciſts. One Eleazer, a Jew, cured many dæmoniacs, he ſays, by means of a root ſet in a ring. This root, with the ring, was held under the patient's noſe, and the devil was forthwith evacuated. The moſt part of conjurers of this claſs were impoſtors, each pretending to a ſecret noſtrum or charm which was an overmatch for the devil. Our Saviour communicated to his diſciples a real power over dæmons, or perhaps over the diſeaſes ſaid to be occaſioned by dæmons. See DÆMONIAC.

Exorciſm makes a conſiderable part of the ſuperſtition of the church of Rome, the rituals of which forbid the exorciſing any perſon without the biſhop's leave. The ceremony is performed at the lower end of the church towards the door. The exorciſt firſt ſigns the poſſeſſed perſon with the ſign of the croſs, makes him kneel and ſprinkles him with holy water. Then follow the litanies, pſalms, and prayer; after which the exorciſt aſks the devil his name, and adjures him by the myſteries of the Chriſtian religion not to afflict the perſon any more: then, laying his right hand on the dæmoniac's head, he repeats the form of exorciſm, which is this: "I exorciſe thee, unclean ſpirit, in the name of Jeſus Chriſt: tremble, O Satan! thou enemy of the faith, thou foe of mankind, who haſt brought death into the world; who haſt deprived men of life, and haſt rebelled againſt juſtice; thou ſeducer of mankind, thou root of evil, thou ſource of avarice, diſcord, and envy." The Romaniſts likewiſe exorciſe houſes and other places, ſuppoſed to be haunted by unclean ſpirits; and the ceremony is much the ſame with that for perſons poſſeſſed.

EXORCISTS, in church-hiſtory, an order of men, in the ancient church, whoſe employment it was to exorciſe or caſt out devils. See the preceding article.

EXORDIUM, in oratory, is the preamble or beginning, ſerving to prepare the audience for the reſt of the diſcourſe.

Exordiums are of two kinds; either juſt and formal, or vehement and abrupt. The laſt are moſt ſuitable on occaſions of extraordinary joy, indignation, or the like. See ORATORY, n° 36.

EXOSTOSIS (from εξ *out*, and οςεον *a bone*), in anatomy, an acute eminence or excreſcence, puſhing preternaturally above the bone.

EXOTERIC and ESOTORIC, are terms denoting *external* and *internal*, and applied to the double doctrine of the ancient philoſophers; the one was public or *exoteric*; the other ſecret or *eſoteric*. The firſt was that which they openly profeſſed and taught to the world; the latter was confined to a ſmall number of choſen diſciples. This method was derived originally from the Egyptians; who, according to the united teſtimony of Herodotus, Diodorus, Siculus, Strabo, Plutarch, &c. had a twofold philoſophy, one ſecret and ſacred, another public and common. The ſame practice alſo obtained among the Perſian Magi, the Druids of the Gauls, and the Brachmans of India. The Egyptian prieſts, with whom it originated, ſuſtained the character of judges and magiſtrates, and probably introduced this diſtinction with a view to the public welfare, and to ſerve the purpoſes of legiſlation and government. Clement of Alexandria informs us, that they communicated their myſteries principally to thoſe who were concerned in the adminiſtration of the ſtate; and Plutarch confirms the ſame declaration. However, others have ſuppoſed that they invented the fables of their gods and heroes, and the other external ceremonies of their religion, to diſguiſe and conceal natural and moral truths; but whatever was the motive of their practice, it was certainly applied to political purpoſes.

EXOTIC, a term properly ſignifying *foreign* or *extraneous*, i. e. brought from a remote or ſtrange country. In which ſenſe we ſometimes ſay *extotic* or *barbarous terms* or *words*, &c. The word is derived from the Greek εξω, εξωθεν *extra*, "without, on the outſide."

EXOTIC, is chiefly applied to plants which are natives of foreign countries, particularly thoſe brought from the Eaſt and Weſt Indies, and which do not naturally grow in Europe.

The generality of exotics, or exotic plants, do not thrive in England without ſome peculiar care and culture; they require the warmth of their own climates; whence the uſe of hot-beds, glaſs-frames, green houſes, &c. See *GREEN-Houſe* and STOVE.

EXPANSION, among metaphyſicians, denotes the idea we have of laſting diſtance, all whoſe parts exiſt together.

EXPANSION, in phyſiology, the enlargement or increaſe of bulk in bodies, chiefly by means of heat. This is one of the moſt general effects of that ſubtile principle, being common to all bodies whatever, whether ſolid or fluid. In ſome few caſes, indeed, bodies ſeem to expand as they grow cold, as water in the act of freezing: but this is found to be owing to the extrication of an infinite number of air-bubbles from the fluid at a certain time: and is not at all a regular and gradual expanſion like that of metals, or and other ſolid or fluid ſubſtance by means of heat. In certain metals alſo, an expanſion takes place when they paſs from a fluid to a ſolid ſtate; but this too is not to be accounted any proper effect of cold, but of the arrangement of the parts of the metals in a certain manner; and is therefore to be accounted a kind of cryſtallization rather than any thing elſe.

The expanſion of bodies by heat is very various, and in ſolids does not ſeem to be guided by any certain rule. In the 48th volume of the Philoſophical Tranſactions, Mr Smeaton has given a table of the expanſions of many different ſubſtances, from which the following particulars are extracted. The degree of heat employed was 180 degrees of Fahrenheit's thermometer, and the expanſion is expreſſed in 10,000th parts of an Engliſh inch.

A foot of white glaſs barometer tube	100
Martial regulus of antimony -	130
Bliſtered ſteel -	138
Hard ſteel - -	147
Iron - -	151
Biſmuth - -	167
Hammered copper -	204
A mixture of three parts of copper with one of tin - -	218
Caſt braſs - -	225
A mixture of 16 parts of braſs with one of tin - -	229
Braſs wire - -	232
Speculum metal -	232
Spelter ſolder, compoſed of two parts of braſs and one of zinc. -	247
Fine Pewter - -	274
Grain tin -	298
Soft ſolder, compoſed of two parts of lead and one of tin, -	301
A mixture of eight parts of zinc and one of tin, a little hammered, -	323
Lead - -	344
Zinc or ſpelter - -	353
Zinc hammered an inch *per* foot	373

From this table it appears, that no rule can be deduced concerning the degrees of expanſion to which bodies are ſubject by the ſame degree of heat, either from their ſpecific gravity or otherwiſe. Zinc, which is much lighter than lead, expands more with heat; but glaſs, which is lighter than either, expands much leſs;

while copper, which is heavier than a mixture of braſs and tin, expands leſs.

Of all known ſubſtances, thoſe of the aerial kind expand moſt by an equal degree of heat; and in general the greater quantity of latent heat that any ſubſtance contains, the more eaſily it is expanded; though even here we cannot form any general rule. It is certain, however, that the moſt denſe fluids, ſuch as mercury, oil of vitriol, &c. are leſs expanſible than water, ſpirit of wine, or ether. This laſt indeed is ſo eaſily expanded, that were it not for the preſſure of the atmoſphere it would be in a continual ſtate of vapour. After bodies are reduced to a vaporous ſtate their expanſion ſeems to go on without any limitation, in proportion to the degree of heat applied; ſo that it is impoſſible to ſay what would be the ultimate effects of that principle upon them in this way. The force with which theſe vapours expand on the application of high degrees is very great; neither can we ſay, that any obſtacle whatever is inſuperable by them. On this principle depend the ſteam-engines ſo much uſed in various mechanical operations; likewiſe ſome hydraulic machines; and the inſtruments called *manometers*, which ſhow the variation of gravity in the external atmoſphere, by the expanſion or condenſation of a ſmall quantity of air confined in a proper veſſel. On this principle alſo perpetual movements might be conſtructed ſimilar to thoſe invented by Mr Coxe, on the principle of the barometer. A variety of other curious machines may be conſtructed on the principle of aerial expanſion; of which an account is given under the articles Hydrostatics and Pneumatics.

The expanſion of ſolid bodies is meaſured by an inſtrument named the Pyrometer; and the force with which they expand is ſtill greater than that of aerial vapours, the flame of a farthing candle producing an expanſion in a bar of iron capable of counteracting a weight of 500 pounds. The quantity of expanſion, however, is ſo ſmall, that it has never been applied to the movement of any mechanical engine. On the principle of the expanſion of fluids Thermometers are conſtructed; for an account of which, ſee that article. For the effects of the different expanſions of metals in correcting the errors of machines for meaſuring time, ſee the article Pendulum.

EXPECTANCY, estates in, are of two ſorts; one created by act of the parties, called a *remainder*; the other, by act of law, called a *reverſion.*

EXPECTATION, in the doctrine of chances, is applied to any contingent event, and is capable of being reduced to the rules of computation. Thus a ſum of money in expectation, when a particular event happens, has a determinate value before that event happens; ſo that if a perſon is to receive any ſum, *e. gr,* 10l. when an event takes place which has an equal probability of happening and failing, the value of the expectation is half that ſum or 5 l. and in all caſes the expectation of obtaining any ſum is eſtimated by multiplying the value of the ſum expected by the fraction which repreſents the probability of obtaining it. The expectation of a perſon who has three chances in five of obtaining 100 l. is equal to $\frac{3}{5} \times 100$ or 60 l. and the probility of obtaining 100 l. in this caſe is equal to $\frac{60}{100} = \frac{3}{5}$.

EXPECTORANTS, in pharmacy, medicines which promote Expectoration.

EXPECTORATON, the act of evacuating or bringing up phlegm or other matters out of the trachea, lungs, &c. by coughing, hauking, ſpitting, &c.

EXPEDITATION, in the Engliſh foreſt-laws, ſignifies a cutting out the balls of a dog's fore-feet for the preſervation of the king's game.

Every one that keeps any great dog not expeditated forfeits three ſhillings and fourpence to the king. In maſtiffs, not the ball of the feet, but the three claws, are to be cut to the ſkin. Inſtit. part iv. p. 308.

This expeditation was to be performed once in every three years, and was done to every man's dog who lived near the foreſt, and even the dogs of the foreſters themſelves.

EXPEDITION, the march of an army to ſome diſtant place, with a view of hoſtilities. Such were the expeditions of Cyrus againſt Xerxes, and of Bacchus and Alexander into the Indies.

Expeditions for the recovery of the Holy Land were called *croiſades.*

EXPERIENCE, a kind of knowledge acquired by long uſe without any teacher. It conſiſts in the ideas of things we have ſeen or read, which the judgment has reflected on, to form for itſelf a rule or method.

Authors make three kinds of experience: The firſt is the ſimple uſes of the external ſenſes, whereby we perceive the phenomena of natural things without any direct attention thereto, or making any application thereof. The ſecond is, when we premeditately and deſignedly make trials of various things, or obſerve thoſe done by others, attending cloſely to all effects and circumſtances. The third is that preceded by a foreknowledge, or at leaſt an apprehenſion of the event, and determines whether the apprehenſion were true or falſe; which two latter kinds, eſpecially the third are of great ſervice in philoſophy.

EXPERIMENT, in philoſophy, is the trial of the reſult or effect of the applications and motions of certain natural bodies, in order to diſcover ſomething of their motions and relations, whereby to aſcertain ſome of their phenomena or cauſes.

EXPERIMENTAL PHILOSOPHY,

IS that which has its foundation in experience, wherein nothing is aſſumed as a truth but what is founded upon ocular demonſtration, or which cannot be denied without violating the common ſenſe and perceptions of all mankind.

In former times philoſophers, when reaſoning about natural things, inſtead of following this method, aſſumed ſuch principles as they imagined ſufficient for explaining the phenomena, without conſidering whether theſe principles were juſt or not. Hence for a great number of ages no progreſs was made in ſcience; but ſyſtems were heaped upon ſyſtems, having neither conſiſtency with one another nor with themſelves. No proper explanations indeed were given of any thing; for all theſe ſyſtems, when narrowly examined, were found to conſiſt merely in changes of words, which were often very abſurd and barbarous. The firſt who deviated from this method of philoſophiſing, if we may call it by that name, was Friar Bacon, who lived in the 16th century, and who ſpent 2000 l. (an immenſe ſum in thoſe days) in making experiments. The admirable Critchton, who flouriſhed about the year 1580, not only diſputed againſt the philoſophy of Ariſtotle, which had for ſo long been in vogue, but wrote a book againſt it. Cotemporary with this celebrated perſonage was Francis Bacon lord chancellor of England, who is looked upon to be the founder of the preſent mode of philoſophiſing by experiments. But though others might lay the foundation, Sir Iſaac Newton is juſtly allowed to have brought this kind of philoſophy to perfection: and to him we are certainly indebted for the greateſt part of it. Unfortunately, however, neither Lord Bacon nor Sir Iſaac Newton had an opportunity of knowing many important facts relating the the principles of fire and electricity, which have ſince been brought to light. Hence all their philoſophy was merely mechanical, or derived from the viſible operations of ſolid bodies, or of the groſſer fluids upon one another. In ſuch caſes, therefore, where the more ſubtile and active fluids were concerned, they fell into miſtakes, or were obliged to deny the exiſtence of the principles altogether, and to make uſe of terms which were equally unintelligible and incapable of conveying any information with thoſe of their predeceſſors. A remarkable inſtance of the errors into which they were thus betrayed, we have in the doctrine of projectiles, where the moſt enormous deviations from truth were ſanctified by the greateſt names of the laſt century, merely by reaſoning from the reſiſtance of the air to bodies moving ſlowly and viſibly, to its reſiſtance to the ſame bodies when moved, with high degrees of velocity*. In other caſes they were reduced to make uſe of words to expreſs immechanical powers, as attraction, repulſion, rarefaction, &c. which have ſince tended in no ſmall degree to embarraſs and confound ſcience by the diſputes that have taken place concerning them. The foundations of the preſent ſyſtem of experimental philoſophy are as follow.

I. All the material ſubſtances of which the univerſe is compoſed are called *natural bodies*. What we perceive uniform and invariable in theſe ſubſtances we call their *properties*. Some of theſe are general and common to all matter, as extenſion; others are proper to particular ſubſtances, for inſtance fluidity; while ſome appear to be compounded of the general and particular properties, and thus belong to a ſtill ſmaller number; as the properties of air, which are derived from the general property of extenſion combined with thoſe of fluidity, elaſticity, &c.

II. In taking a particular review of the properties of bodies, we naturally begin with that of *extenſion*. This manifeſts itſelf by the three dimenſions of length, breadth, and thickneſs. Hence proceeds the diviſibility of matter; which the preſent ſyſtem ſuppoſes to reach even to infinity: but though this propoſition be ſupported by mathematical demonſtrations, it is impoſſible we can either have any diſtinct idea of it, or of the oppoſite doctrine, which teaches that matter is compoſed of exceſſively minute particles called *atoms*, which cannot be divided into ſmaller ones. The ſubtilty indeed to which ſolid bodies may be reduced by mechanical means is very ſurpriſing; and in ſome caſes is ſo great, that we might be tempted to ſuppoſe that a farther diviſion is impoſſible. Thus, in grinding a ſpeculum, the inequalities of its ſurface are ſo effectually worn off, that the whole becomes in a certain degree inviſible, ſhowing not itſelf by the light which falls upon it, but the image of other bodies; but the ſmalleſt ſcratch which diſturbs the equality of the ſurface is at once diſtinctly viſible.

III. From the arrangement of theſe ultimate particles of manner, whatever we ſuppoſe them to be, ariſe the various figures of bodies; and hence figure is a property of all bodies no leſs univerſal than extenſion, unleſs we chooſe to ſpeak of the ultimate particles of matter, which, as they are ſuppoſed to be deſtitute of parts, muſt conſequently be equally deſtitute of figure; and the ſame conſequence will follow whether we adopt this ſuppoſition or the other. The figures of bodies are ſo extremely various and diſſimilar, that it is impoſſible to find any two perfectly alike. It is indeed the next thing to impoſſible to find two in which the diſſimilarity may not be perceived by the naked eye; but if any ſuch ſhould be found, the microſcope will quickly diſcover the imbecility of our ſenſes in this reſpect. Solidity is another property eſſential to all matter. By this we mean that property which one quantity of matter has of excluding any other from the ſpace which itſelf occupies at that time. Hence ariſes what we call *reſiſtance*, which is always an indication of ſolidity; and no leſs ſo in thoſe bodies which we call *fluid* than in thoſe which are the moſt ſolid. This may at firſt ſeem to be a contradiction; but fluids yield only when they can get away from the preſſure; in all other caſes they reſiſt as violently as the moſt ſolid bodies. Thus water confined in a tube will as effectually reſiſt the impreſſion of a piſton thruſt down upon it as though it were the moſt ſolid ſubſtance. Air indeed will yield for a certain time; but this, as appears from ſeveral experiments, is entirely owing to a more ſubtile fluid, viz. that of elementary fire being preſſed out from among its particles. As long as this fluid can be forced out, either from among the particles of air, water, or any other more groſs fluid ſubſtance, the latter will be found compreſſible, as a heap of wet ſand would be by ſqueezing the water out from it: but when we come to the moſt ſubtile of all elements, ſuch as we ſuppoſe that of fire to be, there cannot be any poſſibility of compreſſing it, even though we had a veſſel ſo cloſe as to prevent it from eſcaping through its ſides; becauſe its parts are already as near each other as they can be.

IV. The diſtance of the parts of bodies from each other is what we call their poroſity, and was formerly ſuppoſed to be owing to a vacuum interſperſed between them; but now it is generally allowed that the pores of ſolid bodies as well as of fluids are filled with an extremely ſubtile matter which pervades all nature. The poroſity of bodies with regard to one another may be thus explained. Wood, or a ſponge, is porous with

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* See *Gunnery*.

regard to water; but water itſelf is porous with regard to air, which it abſorbs in conſiderable quantity. Both air and water are porous with regard to the element of fire, which produces very conſiderable changes upon them, according to the quantity of it they contain, or the manner it acts in their pores. This element itſelf, however, is not porous with regard to any other ſubſtance. Its pores, therefore, if it has any, muſt be abſolute vacuities deſtitute of any matter whatever. Vacuities of this kind indeed are ſuppoſed to be abſolutely neceſſary to motion: for though we may ſay, matter being diviſible almoſt *ad infinitum,* that a body or ſubſtance more ſolid may move in another ſubſtance that is more ſubtile, and that will give way to its motion, we muſt nevertheleſs have recourſe to a laſt reſort, and admit of an ultimate vacuum, which will give room ſufficient to the leaſt corpuſcle, that its part *A* may take the place of its part *B* without the leaſt reſiſtance: beſides, it is not to be imagined, that nature, in fact, admits of that infinite diviſibility which our imagination can conceive, and that every thing which is poſſible in idea, is at all times practicable. All that exiſts is poſſible, but all that is poſſible does not however exiſt. By denſity, is underſtood the proportion between the extenſion and ſolidity of a body: one body therefore is more denſe than another, when, under the ſame degree of extenſion, it contains more ſolid matter: and this quality ariſes from condenſation and compreſſion. Elaſticity is nothing more than that effort by which certain bodies, when compreſſed, endeavour to reſtore themſelves to their former ſtate; and this property ſuppoſes them compreſſible. As all theſe natural properties of bodies are of great utility in explaining the principles of phyſics and in applying them to all the arts, experimental philoſophy proves their reality by a thouſand examples.

V. We diſcover ſtill other properties in bodies: ſuch as mobility, which we muſt not here confound with motion. This mobility ariſes from certain diſpoſitions which are not in an equal degree in all bodies: from whence it comes that ſome are more eaſily moved than others: and this proceeds from the reſiſtance to motion which is perceived in all bodies, having regard merely to their maſſes; and this reſiſtance is called *vis inertiæ,* or *inert force.* A body is ſaid to be in motion when it is actually moving from one place to another; or, whenever a body changes its ſituation with regard to the objects that ſurround it, either nearly or remotely, it is ſaid to be in motion. There are three principal matters to be conſidered in a moving body; its direction, its velocity, and the quantity of its motion: and here phyſics explains the force or moving power; it likewiſe diſtinguiſhes between ſimple and compound motion. Simple motion is that which ariſes from only one force, or which tends to only one point. It deſcribes the laws, and explains the reſiſtance, of mediums; the reſiſtance of friction; the difficulties of a perpetual motion; the alteration of direction occaſioned by the oppoſition of a fluid matter; reflected or reverberated motion; the communication of motion by the ſhock of bodies, &c. Compound motion is that of a body impelled to move by ſeveral cauſes or powers which act according to their different directions. Phyſics here likewiſe inveſtigates the laws of motion; and is particularly applied to the explaining, under this head, what are called the *central forces,* which produce a motion that is either circular or in a curve line, and which inceſſantly urge the moving body either to approach or recede from the centre. To diſtinguiſh theſe from each other, the former is called the *centripetal force,* and the latter the *centrifugal force.*

VI. By gravity, or ponderoſity, is to be underſtood that force which occaſions bodies to paſs from a higher to a lower place, when nothing oppoſes their courſe, or when the obſtacles are not ſufficient to ſtop them. Speculative philoſophy inveſtigates its cauſe, and perhaps in vain. Experimental philoſophy contents itſelf with deſcribing the phenomena, and teaching the laws of gravity, which are thoroughly eſtabliſhed by a thouſand reiterated experiments. In order properly to underſtand this ſubject, we muſt take care not to confound the term *gravity* with that of *weight.* By the former, we underſtand that force which urges bodies to deſcend through a certain ſpace in a given time. By the latter, is meant the quantity of a heavy body that is contained under the ſame bulk. The phenomena are explained by the experiments themſelves, and by inferences deduced from them.

VII. Hydroſtatics is a ſcience of which the object is the gravity and equilibrium of fluids in particular. Though the gravity of theſe bodies is the ſame with that of others, and is ſubject to the ſame laws, yet their ſtate of fluidity gives riſe to particular phenomena, which it is of conſequence to know. But as hydroſtatics cannot be ſucceſsfully treated on without the aſſiſtance of calculation, it has been ranked among the mathematical ſciences.

VIII. We ſay the ſame with regard to mechanics; which is the art of employing, by the aid of machines, the motion of bodies, in conformity to its properties and laws, as well with regard to ſolids as fluids, either more commodiouſly or more advantageouſly.

IX. After it has made the moſt accurate experiments, and the moſt judicious obſervations, on all theſe different ſubjects, and the properties of bodies in particular, Experimental Philoſophy paſſes to the examination of the air, the water, fire, the wind, colours, &c. The air is a fluid with which we are ſurrounded from the inſtant of our birth, and without which we cannot exiſt. It is by the properties and the influences of the air, that nature gives increaſe and perfection to all that it produces for our wants and conveniencies; it is the ſpirit of navigation: ſound, voice, ſpeech itſelf, are nothing more than percuſſions of the air: this globe that we inhabit is completely ſurrounded by air; and this kind of coverture, which is commonly called the *atmoſphere,* has ſuch remarkable functions, that it evidently appears to concur to the mechaniſm of nature. Experimental phyſics, therefore, conſiders the air, 1. Of itſelf, independent of its bulk; and the figure of its whole body: it examines its eſſential properties; as its gravity, denſity, ſpring, &c. The air-pump is here of indiſpenſable uſe; and by this machine phyſics examines in what manner ſpace, or a vacuum, is made. It likewiſe ſhows the neceſſity of air to the preſervation of animal-life; the effect it has on ſound, fire, and gunpowder, *in vacuo*; and a hundred other experiments of various degrees of curioſity. 2. It conſiders the air as the terreſtrial atmoſphere, ſometimes as a fluid at reſt, and ſometimes as in motion.

And by theſe means it accounts for the variation of the mercury in the barometer, and why it ſinks in proportion as the height of the atmoſphere diminiſhes; as alſo for the figure, the extent, and weight of the atmoſphere: it ſhows the method of determining the height of mountains, the nature of ſound in general, of its propagation, and of ſonorous bodies. The late diſcoveries of Dr Prieſtley and others have added a new and a very conſiderable branch to experimental philoſophy in this reſpect, of which an account is given under the article AEROLOGY.

X. It is here alſo that experimental philoſophy conſiders the nature of the wind; which is nothing more than agitated air, a portion of the atmoſphere that moves like a current, with a certain velocity and determinate direction. This fluid, with regard to its direction, takes different names according to the different points of the horizon from whence it comes, as eaſt, weſt, north, and ſouth. Winds are likewiſe diſtinguiſhed into three ſorts; one of which is called *general* or *conſtant*, as the trade-winds which continually blow between the tropics; another is the *periodical*, which always begin and end within a certain time of the year, or a certain hour of the day, as the monſoons, the land-breezes and ſea-breezes, which ariſe conſtantly in the morning and evening; and laſtly, ſuch as are *variable*, as well with regard to their direction as their velocity and duration.

M. Mariotte computes the velocity of the moſt impetuous wind to be at the rate of 32 feet in a ſecond, and Mr Derham makes it 66 feet in the ſame time. The firſt, doubtleſs, meant the wind of the greateſt velocity that had come to his knowledge. The invention of aeroſtatic machines has tended more to ſhow the real velocity of the wind than any other invention as yet made public: but all of them move ſlower than the aerial current; ſo that the real velocity of the wind remains yet undetermined.

XI. The force of the wind, like that of other bodies, depends on its velocity and maſs; that is, the quantity of air which is in motion: ſo the ſame wind has more or leſs force on any obſtacle that oppoſes it, in proportion as that obſtacle preſents a greater or a leſs ſurface: for which reaſon it is that they ſpread the ſails of a veſſel more or leſs, and place the wings of a windmill in different directions. The machines by which the winds are meaſured, are called *anemometers*. They ſhow the direction, the velocity, and the duration of winds. It is by the agitations of the wind that the air is purified; that the ſeeds of trees and herbs are conveyed through the foreſts and fields; that ſhips are driven from one pole to the other; that our mills turn upon their axes, &c.; and art, by imitating nature, ſometimes procures us artificial winds, by which we refreſh our bodies, invigorate our fires, purify our corn, &c.

XII. Water is an univerſal agent, which nature employs in all her productions. It may be conſidered as in three ſtates, 1. As a liquid; 2. As a vapour; 3. As ice. Theſe three different ſtates do not in any manner change its eſſence, but make it proper to anſwer different ends. The natural ſtate of water would be that of a ſolid body, as fat, wax, and all thoſe other bodies which are only fluid when heated to a certain degree: for water would be conſtantly ice, if the particles of fire, by which it is penetrated in the temperate climates, did not render it fluid, by producing a reciprocal motion among its parts; and, in a country where the cold is continually ſtrong enough to maintain the congelation, the aſſiſtance of art is neceſſary to make it fluid in the ſame manner as we do lead, &c. Water, when not in ice, is a fluid that is inſipid, tranſparent without colour, and without ſmell, and that eaſily adheres to the ſurface of ſome bodies, that penetrates many, and extinguiſhes fire. Experimental philoſophy inveſtigates the origin of fountains; the cauſe of the ſaltneſs of the ſea; the means of purifying water; what is its weight, and what are its effects when heated, &c. It likewiſe examines this fluid in the ſtate of vapour; and finds that a drop of water, when in vapour, occupies a ſpace vaſtly greater than it did before. It explains the *æolipile* and its effects; fire-engines; and the force of vapours that give motion to immenſe machines in mines and elſewhere, &c. and laſtly, it conſiders water in the ſtate of ice. Ice conſequently is more cold than water; and its coldneſs increaſes if it continue to loſe that matter, already too rare, or too little active to render it fluid. Experimental phyſics endeavours to inveſtigate the cauſes of the congelation of water, and why ice is lighter than water; from whence it derives that expanſive force by which it breaks the containing veſſel; the difference there is between the congelation of rivers and that of ſtanding waters; why ice becomes more cold by the mixture of ſalts; and many other ſimilar phenomena.

XIII. The nature of fire is yet very much unknown to the moſt learned philoſophers. As objects when at a great diſtance are not perceptible to our ſenſes, ſo when we examine them too nearly, we diſcern them but confuſedly. It is ſtill diſputed whether fire be a homogene, unalterable matter, deſigned by its preſence, or by its action to produce heat, inflammation, and diſſolution, in bodies; or if its eſſence conſiſts in motion only, or in the fermentation of thoſe particles which we call *inflammable*, and which enter as principles, in greater or leſs quantities, in the compoſition of mixed bodies. The moſt learned inquirers into nature incline to the former opinion; and have recourſe to a matter which they regard as the principle of fire. They ſuppoſe that there is in nature a fluid adapted to this purpoſe, created ſuch from the beginning, and that nothing more is neceſſary than to put it in action. The numberleſs experiments which are daily made in electricity ſeem to favour this opinion, and to prove that this matter, this fluid, this elementary fire, is diffuſed through all nature, and in all bodies, even ice itſelf. We cannot ſay to what important knowledge this great diſcovery of electricity may lead if we continue our inquiries concerning it. It appears, however, that we may believe, without any inconvenience or abſurdity, that fire and light, conſidered in their firſt principle, are one and the ſame ſubſtance differently modified.

XIV. Be this matter, however, as it may, experimental philoſophy is employed in making the moſt ingenious and moſt uſeful reſearches concerning the nature of fire, its propagation, and the means by which its power may be excited or augmented; concerning the phoſphorus and its inflammation; fire excited by the reflection of the ſun's rays from a mirror; and on the effects of fire in general; concerning lightning and its effects; the fuſion of metals; gunpowder and its exploſion ; flame and the aliments of fire ; and an infinity of like objects which it explains, or concerning which it makes new diſcoveries, by the aid of experiments.

XV. By the word *light*, we underſtand that agent by which nature affects the eye with that lively and almoſt conſtantly pleaſing ſenſation, which we call *ſeeing*, and by which we diſcern the ſize, figure, colour, and ſituation of objects, when at a convenient diſtance. All philoſophers agree, that the light, which is diffuſed in any place, is a real body. But what this body is, and by what means it enters that place where it is perceived, is a queſtion about which philoſophers are divided.

XVI. Experimental philoſophy is applied in diſcovering or proving, by an infinity of experiments, what is the nature of light, in what manner it is propagated, what its velocity and progreſſive motion. It alſo inveſtigates and explains the principles of *optics* properly ſo called, and ſhows the directions which light obſerves in its motion. From thence it proceeds to the examen of the principles of catoptrics, and deſcribes the laws and effects of reflected light. It next treats of the principles of dioptrics, and explains the laws of refracted light; and laſtly, it teaches, from the principles of natural and artificial viſion, the conſtructing of optical inſtruments, as lenſes, concave mirrors, priſms, teleſcopes, &c. &c. and the uſes to which they are applied.

XVII. By reſolving or ſeparating the rays of light, philoſophy has obtained true and clear diſcoveries of the nature of colours. We are naturally led to imagine that colours, and their different degrees, make a part of the bodies that preſent them to our ſight; that white is inherent in ſnow, green in leaves and graſs, and red in a ſtuff dyed of that colour. But this is far from being true. If an object, which preſents any colour to our ſight, be not illuminated, it preſents no colour whatſoever. In the night all is black. Colours therefore depend on light ; for without that we could form no idea of them ; but they depend alſo on bodies ; for of ſeveral objects preſented to the ſame light, ſome appear white, others red, blue, &c. But all theſe matters being ſeparate from our own bodies, we ſhould never acquire any ideas of them, if the light, tranſmitted or reflected by theſe objects, did not make them ſenſible to us, by ſtriking upon the organs of our ſight, and if theſe impreſſions did not revive in us thoſe ideas which we have been uſed to expreſs by certain terms. For theſe reaſons philoſophy conſiders colours from three points of view, 1. As in the light ; 2. In bodies, as being coloured ; and, 3. From the relation they have to our viſual faculties, which they particularly affect, and by which we are enabled to diſtinguiſh them.

It is unneceſſary in this place to ſay more either on colour in particular or experimental philoſophy in general. The different ſubjects of this collective article are particularly treated under their proper names, in the order of the alphabet : the reader will therefore turn, as he has occaſion, to ACOUSTICS, CATOPTRICS, CHROMATICS, DIOPTRICS, HYDROSTATICS, MECHANICS, OPTICS, PENUMATICS, ELECTRICITY, MAGNETISM, *&c. &c. &c.* Alſo AEROLOGY, AEROSTATION, ATMOSPHERE, *BURNING-glaſs*, COLD, COLOUR, CONGELATION, EVAPORATION, FIRE, FLAME, FLUIDITY, HEAT, IGNITION, LIGHT, SOUND, STEAM, WATER, WIND, &c.

EXPERIMENTUM CRUCIS, a capital, leading, or deciſive experiment ; thus termed, either on account of its being like a croſs, or direction-poſt placed in the meeting of ſeveral roads, guiding men to the true knowledge of the nature of that thing they are enquiring after ; or, on account of its being a kind of torture, whereby the nature of the thing is at were extorted by force.

EXPHORESIS. See ORATORY, n° 85.

EXPIATION, a religious act, by which ſatisfaction or atonement is made for the commiſſion of ſome crime, the guilt done away, and the obligation to puniſhment cancelled.

Expiations among the Heathens, were of ſeveral kinds ; as ſacrifices and religious waſhings. They were uſed for effacing a crime, averting any calamity, and on numberleſs other occaſions, as purifying towns, temples, and ſacred places, and armies before and after battle. And they were performed for whole cities as well as particular perſons.

The method of expiation among the Jews was chiefly by ſacrifice, whether for ſins of ignorance, or to purify themſelves from certain pollutions.

Feaſt of EXPIATION among the Jews, called by our tranſlators the *day of atonement*, was held on the tenth day of Tiſri, or the ſeventh month of the Jewiſh year, anſwering to part of our September and October. It was inſtituted by God himſelf, Levit. xxiii. 27, &c. On that day the high-prieſt, the figure or type of Jeſus Chriſt, entered into the moſt holy place, and confeſſed his ſins ; and, after ſeveral ceremonies, made an atonement for all the people to waſh them from their ſins. Lev. chap. xvi. See *SCAPE-Goat*.

EXPIATION, in a figurative ſenſe, is applied by divines to the pardon procured to the ſins of the penitent by the merit of Chriſt's death. See the article CHRISTIANITY.

EXPIRATION, in medicine. See EXSPIRATION.

EXPIRATION, is alſo uſed figuratively, for the end of a term of time granted, agreed on, adjudged.

EXPLICIT, in the ſchools, ſomething clear, diſtinct, formal, and unfolded.

EXPLOSION, in natural philoſophy, a ſudden and violent expanſion of an aerial or other elaſtic fluid, by which it inſtantly throws off any obſtacle that happens to be in the way, ſometimes with incredible force, and in ſuch a manner as to produce the moſt aſtoniſhing effects upon the neighbouring objects.

1 Difference between exploſion and expanſion.

Exploſion differs from expanſion, in that the latter is a gradual and continued power, acting uniformly for ſome time ; whereas the former is always ſudden, and only of momentary duration. The expanſions of ſolid ſubſtances do not terminate in violent exploſions, on account of their ſlowneſs, and the ſmall ſpace through which the metal, or other expanding ſubſtance, moves; though their ſtrength may be equally great with that of the moſt active aerial fluids. Thus we find, that though wedges of wood, when wetted, will cleave ſolid blocks of ſtone, they never throw them to any diſtance, as is the caſe with gun-powder. On the other hand, it is ſeldom that the expanſion of any elaſtic fluid burſts a ſolid ſubſtance without throwing the fragments of it to a conſiderable diſtance, the effects of which are often very terrible.

2 General cauſes of exploſions.

The reaſons of this may be compriſed in the two following particulars: 1. The immenſe velocity with which the aerial fluids expand, when affected by a conſiderable degree of heat; and, 2. Their celerity in acquiring heat and being affected by it, which is much ſuperior to that of ſolid ſubſtances. Thus air, heated as much as iron when brought to a white heat, is expanded to four times its bulk; but the metal itſelf will not be expanded the 500th part of the ſpace. In the caſe of gunpowder, which is a violent and well-known exploſive ſubſtance, the velocity with which the flame moves is calculated by Mr Robins, in his Treatiſe upon Gunnery. to be no leſs than 7000 feet in a ſecond, or little leſs than 79 miles per minute. Hence the impulſe of the fluid is inconceivably great, and the obſtacles on which it ſtrikes are hurried off with a vaſt velocity, though much leſs than that juſt mentioned; for a cannon bullet, with the greateſt charge of powder that can be conveniently given, does not move at a greater rate than 2400 feet per ſecond, or little more than 27 miles per minute. The velocity of the bullet again is promoted by the ſudden propagation of the heat through the whole body of air as ſoon as it is extricated from the materials of which the gunpower is made; ſo that it is enabled to ſtrike all at once, and thus greatly to augment the momentum of the ball. It is evident that this contributes very much to the force of the exploſion by what happens when powder is wetted or mixed with any ſubſtance, which prevents it from taking fire all at once. In this caſe the force of the exploſion, even when the ſame quantity of powder is made uſe of, cannot be compared to that of dry powder.

Upon theſe principles we may conclude, that the force of an exploſion depends. 1. On the quantity of elaſtic fluid to be expanded; 2. On the velocity it acquires by a certain degree of heat; and, 3. On the celerity with which the degree of heat affects the whole of the expanſile fluid.

3 Electric exploſions the ſtrongeſt of all.

Theſe three take place in the greateſt perfection where the electric fluid is concerned; as in caſes of lightning, earthquakes, and volcanoes. This fluid, as is ſhown in many parts of this work, differs not from elementary fire or the light of the ſun; it pervades the whole ſyſtem of nature; its expanſion is nothing elſe than its motion from a centre towards a circumference, for it does not ſeem capable of any proper expanſion by a ſeparation of its parts like any other fluid. Hence, when it begins to expand in this manner, the motion is propagated through it with a velocity far exceeding that of any other fluid whatever. Thus, even when the quantity is exceſſively ſmall, as when an electric ſpark is ſent through a glaſs full of water or of oil, the expanſion is ſo violent as to diſſipate the glaſs into innumerable fragments with great danger to the by-ſtanders, as is obſerved under the article Electricity. In violent lightning, where the electric fluid collects itſelf into balls, the ſtrength of the expolſion is proportionable to the quantity. Every one has heard of the prodigious effects of lightning when it happens to ſtrike buildings, trees, or even the moſt ſolid rocks; and in ſome caſes, where the quantity of electricity is ſtill greater than in any flaſh of lightening, we hear of ſtill more tremendous conſequences enſuing. Dr Prieſtley gives an inſtance of a large fire-ball (undoubtedly a quantity of electric matter) rolling on the furface of the ſea, which after riſing up to the top-maſt of a ſhip of war, burſt with ſuch violence that the exploſion reſembled the diſcharge of hundreds of cannon fired at once. Great damage was done by it; but there is not the leaſt doubt that moſt of its force was ſpent on the air, carried down to the ſea by the maſt and iron-work of the ſhip. Indeed, conſidering that in all caſes a great part of the force of electric exploſions is diſſipated in this manner, it may juſtly be doubted whether they can be meaſured by any method applicable to the menſuration of other forces. Even in artificial electricity the force is prodigiouſly great; inſomuch that Dr Van Marum calculated that of the great battery belonging to the machine in Teyler's muſeum to be upwards of 900 pounds.

4 Volcanic exploſions next in ſtrength.

In thoſe caſes where the electrical matter acts like common fire, the force of the exploſions, though exceedingly great, is capable of menſuration by comparing the diſtances to which the bodies are thrown with their weight. This is moſt evident in volcanoes, where the projections of the burning rocks and lava manifeſt the greatneſs of the power, at the ſame time that they affords a method of meaſuring it. Theſe exploſions, as is ſhown under the article Volcano, are owing to extrication of aerial vapours, and their rarefaction by intenſe heat.

5 In what manner aerial exploſions take place.

In all of them the air is originally in a ſtate of decompoſition, viz. its inviſible and ſolid part is joined with ſome terreſtrial ſubſtance. Thus, when fixed air, for inſtance, is expoſed to any pure earth which attracts it, as calcined magneſia, a decompoſition inſtantly takes place. All theſe vapours* are compoſed of elementary fire and ſome inviſible ſubſtance capable of aſſuming a ſolid form. The decompoſition juſt mentioned is therefore eaſily explained; the ſolid part of the air joins itſelf to the magneſia, while the elementary fire or latent heat is diſſipated, and paſſes thro' the ſides of the veſſel. Were it now in our power ſuddenly to reſtore the latent heat to the whole of the fixed air, ſo that it would at once aſſume its former expanſion, a violent exploſion would follow. This ſeems to be preciſely the caſe with the volcanic exploſions. An immenſe quantity of the fixed part of different aerial fluids is united to the various ſubſtances found below the ſurface of the earth. By means of the electric fire which kindles the volcanoes, the aerial fluids are ſuddenly reſtored to their elaſtic ſtate; and not only ſo, but their natural elaſticity is grealy augmented, ſo that the exploſions take place with great violence.

6 Exploſion of gunpowder explained.

The caſe is the ſame with gunpowder; only that the condenſed air in this caſe is at firſt of the dephlogiſticated kind, but is quickly phlogiſticated by reaſon of the combuſtible matters mixed with the nitre, while the heat produced by the inflammation augments the elaſticity of the generated air to four times what it uſually is, ſo that the whole force of the exploſion is calculated at 1000 times the preſſure of the common atmoſphere*. Thus the exploſions of gunpowder and of volcanoes are eſſentially the ſame. The reaſon of the extreme quickneſs of thoſe of gunpowder is, that it takes fire ſo readily by the intimate mixture and combuſtibility of all the materials. In volcanoes the exploſions likewiſe follow one another very quickly, and are by no means inferior in ſtrength to thoſe of gunpowder: but here the quantity of vapour makes up for the comparative ſlowneſs with which it is affected by the heat. Thus, though we could not by any means contrive to fire cannon in quick ſucceſſion by means of calcareous earth as we can do with gunpowder, yet in the huge furnace of a volcano the elaſtic matter is ſupplied in ſuch quantities, that the exploſions are in a manner unremitting; and even in ordinary experiments the confinement of aerial vapours has often occaſioned violent exploſions in chemical veſſels. In one caſe too the extrication of fixed air adds exceſſively to the force of an exploſion, *viz.* in that of pulvis fulminans. This is compounded of ſulphur, ſaltpetre, and ſalt of tartar. The latter we know contains much fixed air; and it is probable that the violence of the exploſion is occaſioned by this air; for the greater quantity of it that the alkaline ſalt contains, the greater force does it explode with. Fulminating gold emits a quantity of phlogiſticated air, to which its exploſive power is ſuppoſed to be owing, as is explained under the article CHEMISTRY; but that of fulminating ſilver is ſo extraordinary, that ſcarce any force of aerial vapour that can be extricated is likely to produce it, and it ſeems probable that electricity itſelf is concerned.

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* See *Elaſtic Vapours.*

7
Of pulvis fulminans, &c.

8
Exploſions by aqueous vapours.

9
Violent exploſion of water with melted copper.

10
Probably owing to a decompoſition of the water.

11
Particularly explained:

Next in ſtrength to the aerial vapours are thoſe of aqueous and other liquids. The moſt remarkable effects of theſe are obſerved in ſteam-engines; but there is one particular caſe from which it has been inferred that aqueous ſteam is vaſtly ſtronger than the flame of gunpowder. This is when water is thrown upon melted copper: for here the exploſion is ſo ſtrong as almoſt to exceed imagination: and the moſt terrible accidents have been known to happen from ſuch a ſlight cauſe as one of the workmen ſpitting in the furnace where copper was melting. Here, however, it is moſt probable that a decompoſition of the water takes place. That this element can be decompoſed or reſolved into an aerial and a ſolid ſubſtance, is extremely probable from the experiments of Dr Prieſtley, as well as thoſe of the French philoſophers. The poſition is indeed denied by the phlogiſtians; but their arguments appear not to be concluſive; nor is it a fact which militates in the leaſt againſt their principles. On the ſuppoſition that the water is decompoſed in the preſent caſe, however, the phenomenon in queſtion is eaſily ſolved. The water being thrown in ſubſtance upon the melted copper, is decompoſed by the violent heat; and one part of it adheres to the metal, thus converting it into a kind of calx, while the other is converted into inflammable or ſome other kind of air, which expanding ſuddenly, throws the melted metal all about with the greateſt violence by means of its re-action.

To underſtand the manner in which this is accompliſhed, we muſt conſider ſome of the principles of GUNNERY laid down by Mr Robins, and related under that article. One of theſe is, that though the air, in caſes of ordinary velocity, makes no great reſiſtance, it is far otherwiſe where the velocity of the moving body becomes very great. In all caſes of exploſion alſo there is in the firſt inſtance a vacuum made by the exploding fluid; and conſequently the weight of the atmoſphere is to be overcome, which amounts to about 15 pounds on every ſquare inch of ſurface. Suppoſing the ſurface of the exploding fluid, then, on that of melted copper to contain an area of 4 ſquare inches, it meets with a reſiſtence of 60 pounds from the atmoſphere, and conſequently communicates an equal preſſure to the fluid metal. Even this muſt of conſequence throw it about, unleſs the ſame preſſure was exactly diffuſed over every part of the ſurface: But much more muſt this effect be increaſed by the immenſe velocity with which the fluid moves, and by which the reſiſtance of the atmoſphere is augmented in a prodigious degree, as is explained under the article GUNNERY. The elaſtic fluid generated is then confined not only by the fluid metal and ſides of the furnace, but by the air itſelf, which cannot get out of the way; ſo that the whole reſembles a cannon cloſed at the mouth, and filled with inflamed gunpowder. Hence not only the melted metal, but the furnace itſelf and the adjacent walls of the building, are hurried off as they would be by the firing of a great quantity of gunpowder in a ſmall ſpace, and which is well known to produce analogous effects.

12
Is not owing to mere aqueous ſteam intenſely heated.

In explaining the phenomenon in queſtion, Dr Black ſuppoſes that the mere heat of the metal applied to the aqueous ſteam produces the exploſion; and in proof of this alleges, that copper imbibes a greater quantity of heat during fuſion than any other metal. Aqueous ſteam, however, ſeems to be too ſlow for producing ſuch ſudden and violent effects. Exploſions, it is true, will be occaſioned by it, but then it muſt be confined for a very conſiderable time; whereas the effects of water thrown upon melted copper are inſtantaneous.

13
Why ſuch exploſions do not take place with other metals.

It may now be aſked, Why ſuch exploſions do not take place with any other metal, iron for inſtance, when water is thrown upon its ſurface in fuſion? In anſwer to this we muſt obſerve, That though water is decompoſed by being applied to red-hot iron in the form of ſteam, yet there is a poſſibility, that when the ſame element is applied in ſubſtance with the fluid metal, no decompoſition may enſue. Something like this indeed happens with copper itſelf; for, notwithſtanding the violent effects which take place on the contact of water in ſubſtance with the melted metal, no exploſion happens though aqueous ſteam be blown upon its ſurface. On the contrary, the upper part of the metal is thus cooled, and forms itſelf into cakes, which are afterwards taken off, and new ones formed in the ſame manner; neither does aqueous ſteam affect red-hot copper in the manner that it does iron in the ſame ſtate. A deciſive proof that the exploſion is not occaſioned by the mere heat of the aqueous ſteam may be deduced from the example of melted glaſs, which produces no exploſion though we pour water upon it in that ſtate; and yet the heat of melted glaſs is undoubtedly equal at leaſt to that of melted copper. It muſt be obſerved, however, that in all caſes where a very hot body is thrown upon a ſmall quantity of water in ſubſtance, an exploſion will follow; but here the water is confined and ſuddenly rarefied into ſteam, which cannot get away without throwing off the body which

14
Exploſions when heated ſubſtances are thrown upon ſmall quantities of water.

confines

* See the article *Gunnery*.

confines it. Examples of this kind frequently occur where maſons or other mechanics are employed in faſtening cramps of iron into ſtones; where, if there happens to be a little water in the hole into which the lead is poured, the latter will fly out in ſuch a manner as ſometimes to burn them ſeverely. Terrible accidents of this kind have ſometimes happened in founderies, when large quantities of melted metal have been poured into wet moulds. In theſe caſes, the ſudden expanſion of the aqueous ſteam has thrown out the metal with violence; and if any decompoſition has taken place at the ſame time, ſo as to convert the aqueous into an aerial vapour, the exploſion muſt be ſtill greater.

15
By pouring cold water into boiling oil.

To this laſt kind of exploſion we muſt refer that which takes place on pouring cold water into boiling or burning oil or tallow. Here the caſe is much the ſame whether we pour the oil on the water, or the water on the oil. In the former caſe, the water which lies at the bottom is rarefied into ſteam and explodes; in the latter, it ſinks down through the oil by its ſuperior ſpecific gravity, and explodes as it paſſes along. In either caſe, however, the quantity of aqueous fluid muſt be but ſmall in proportion to that of the oil: a very great quantity would put out the flame, or deſtroy the heat, in whatever way we applied it.

16
Exploſions in ſolid ſubſtances explained.

Another kind of exploſion is that which takes place in ſolid ſubſtances, where we can ſcarce ſuppoſe either aqueous or aerial vapours to be concerned. The moſt remarkable of theſe are the *volcanic bombs* mentioned by Sir William Hamilton in the great eruption of Veſuvius in 1779. They were large pieces of lava which burſt in pieces like bombs as they fell to the ground; but he does not inform us whether their burſting was attended with any great violence or not. Indeed, amidſt ſuch ſcenes of horror, and the continual tremendous exploſions of the volcano, ſmaller phenomena of this kind would probably be overlooked. Other examples are the *Glass-Tears*, of which an account is given under that article; the burſting of electrical globes, when put in motion; of other glaſs-veſſels ſpontaneouſly, and ſeemingly without any cauſe; and laſtly, the burſting of large caſt-metal veſſels in the act of cooling. Theſe are all ſo ſimilar to one another, that it is probable they depend on one general cauſe. All of them agree in this reſpect, that the extreme parts of them are conſiderably cooled, while the internal remain very hot. Thus, in the volcanic bombs, the current of air, formed by their ſwift paſſage through it in falling, neceſſarily carries off a great quantity of heat from the parts which are in contact with it, while the reſt are ſcarce at all cooled. The glaſs-tears are artificially cooled on the outſide by dropping them upon water; and in conſequence of this, their exploſion is probably more violent in proportion to their bulk than that of the volcanic bombs. Glaſs-veſſels only burſt ſpontaneouſly when they have not been well annealed; and we know that this bad annealing conſiſts only in applying cold too ſuddenly to the outſide. Something like this probably takes place when caſt-iron veſſels explode; and we are certain it does ſo with electrical globes, for theſe laſt are not apt to burſt if they have been well annealed. In all caſes, therefore, there is a remarkable contraction of the outward ſurface by the cold, while the internal parts remain as much expanded as ever. In this caſe there muſt be a continual effort of that ſubtile fluid called *elementary fire*, from the internal to the external part, as the contraction gradually proceeds the contrary way. Thus, when a volcanic bomb, for inſtance, is cooled on the outſide, its parts are conſolidated ſo that the internal fluid has not ſuch an eaſy paſſage through it as is neceſſary. In conſequence of this it makes a greater effort, which is ſtill farther augmented by the cooling and contraction of the internal parts ſqueezing the fluid out from among themſelves, and forcing it to recoil upon that in the centre, as well as to exert itſelf againſt the external part; from which united operation the effect already mentioned at laſt takes place. This explanation, however, does not hold with reſpect to electrical globes, glaſs-tears, or ill-annealed glaſs: but in order to accommodate it to all theſe, we have only to remember, that *fire*, and the electric fluid acting from a centre to a circumference, are not in the leaſt different; ſo that from whatever cauſe the electric matter is diſpoſed to act in this manner, the ſame effect will follow, *i. e.* an exploſion will take place if the ſubſtance does not afford an equally ready paſſage through all its parts, and that whether any ſenſible heat is felt in it or not.

17
Exploſion of inflammable and dephlogiſticated air.

The only other kind of exploſion we have to take notice of is that produced by inflammable and dephlogiſticated air, when mixed together and ſet on fire. This differs from any of thoſe hitherto conſidered, becauſe in reality there is an abſolute condenſation rather than an expanſion throughout the whole of the operation; and could the airs be made to take fire throughout their whole ſubſtance abſolutely at the ſame inſtant, there would be no exploſion, but only a ſudden production of heat. From this cauſe alſo is derived a very ſingular phenomenon taken notice of by Dr. Prieſtley in his late experiments on that ſubject, recorded in the Phil. Tranſ. Having incloſed ſeveral quantities of inflammable and dephlogiſticated air in a copper veſſel, firing them afterwards by the electric ſparks, he found that the force of the exploſion was directed more towards one part of the veſſel than another; leaſt on that part where the electrical diſcharge was made, and moſt upon that which was fartheſt from it. This inequality was very conſiderable; inſomuch that he could not repeat his experiments any number of times without injuring the veſſel in that part which was fartheſt from the diſcharge. The reaſon he gives for this is, that the mixture was not fired at the ſame inſtant, but firſt at the place where the diſcharge was made. This firſt exploſion would have acted equally upon all parts of the veſſel, had it not been for the intervention of the air. By the firſt momentary exploſion, however, the air in the fartheſt part of the veſſel was condenſed, ſo that the next exploſion was made ſtronger, while the copper in the fore-part of the veſſel had the whole of this ſtrong exploſion to reſiſt, the hinder part being but little concerned, as the air in it was condenſed and reduced almoſt to a vacuum.

18
Singular phenomenon obſerved by Dr. Prieſtley.

19
Uſes to which exploſions are applied.

Though the phenomena of exploſions are ſometimes very deſtructive, they are likewiſe of conſiderable uſe in life, by removing obſtacles which could ſcarcely be got the better of by any mechanical power whatever. The principal of theſe are the blowing up of rocks, the ſeparating of ſtones in quarries, and other purpoſes of that kind. The deſtruction occaſioned by them in times of war, and the machines formed upon the principle of exploſion for the deſtruction of the human race, are well known; and if we cannot call theſe *uſeful*, we muſt allow them at leaſt to be neceſſary evils. For the production of exploſions, gunpowder is the only ſubſtance that has yet been found to anſwer; nevertheleſs, as its uſe is attended with a conſiderable expenſe, ſeveral attempts have been made to find out a cheap ſubſtitute for it. One of the moſt remarkable of theſe was by mixing ſmall quantities of water incloſed in little bladders or ſome eaſily deſtructive vehicles along with a charge of powder. By this contrivance it was hoped, that the water being converted into vapour when the powder was inflamed, would augment the force of the exploſion: but inſtead of this, it was found greatly to diminiſh it. The reaſon was evident, viz. that the converſion of the water into ſteam required ſo much of the latent heat of the inflamed gunpowder, that enough was not left to give the neceſſary expanſion to the aerial fluid produced. A mixture of inflammable and dephlogiſticated air has alſo been tried; but the exploſion here has always been found too weak. In mines, indeed, very terrible effects are produced by ſuch mixture, but in theſe the quantity is immenſe; ſo that the comparative weakneſs of the mixture cannot be diſcovered. Electricity therefore ſeems to be the only reſource we have; except by adding ingredients to gunpowder which may increaſe the ſtrength of it. There can be no doubt indeed that the electric fluid is poſſeſſed of ſufficient ſtrength to perform every thing we could deſire; and electricians have ſuppoſed, perhaps juſtly enough, that a cannon charged with water might, by means of electricity, become more dangerous than one charged with gunpowder: but this fluid is ſo exceeding capricious, ſo imperceptible and unmanageable, that the uſe of it cannot as yet be thought practicable, nor in all probability ever will be ſo.

20
Attempts to ſupercede the uſe of gunpowder.

21
Effects of exploſions on the atmoſphere and electric fluid.

The effects of exploſions, when violent, are felt at a conſiderable diſtance, by reaſon of the concuſſions they give to the atmoſphere; for, as has been already hinted, all of them act upon the atmoſpherical fluid with the very ſame force they exert upon terreſtrial ſubſtances ſubjected to their action. Sir William Hamilton relates, that at the exploſions of Veſuvius in 1767, the doors and windows of the houſes at Naples flew open if unbolted, and one door was burſt open though it had been locked. A great quantity of gunpowder being put into the ditch of a fortified city, and ſet on fire, deſtroyed part of the wall, and broke down one of the gates. The blowing up of powder-magazines or powder-mills will deſtroy buildings and kill people, though certainly without the reach of the flame, and untouched by any part of the ſhattered magazine or mill. But the moſt curious effect is, that they electrify the air and even glaſs-windows at a conſiderable diſtance. This is always obſervable in firing the guns of the Tower at London: and ſome years ago, after an exploſion of ſome powder-mills in the neighbourhood of that city, a great number of people were alarmed by a rattling and breaking of their china-ware; which by the vulgar was taken for a ſupernatural phenomenon, but undoubtedly was owing to ſome commotion in the electrical fluid from the violent concuſſion of the atmoſphere. In this reſpect, however, the effects of electrical exploſions themſelves are moſt remarkable, though not in the uncommon way juſt mentioned; but it is certain, that the influence of a flaſh of lightning is diffuſed for a great way round the place where the exploſion happens, producing many very perceptible changes both on the animal and vegetable creation.

EXPONENT, in algebra, the ſame with index. See ALGEBRA.

EXPONENT is alſo uſed in arithmetic, in the ſame ſenſe as index or logarithm.

EXPORTATION, the ſhipping and carrying out of the ſtate wares and commodities for other countries. See the articles COMMERCE, TRADE, and SHIPPING.

EXPOSING, the act of ſetting a thing to public view. In the Romiſh church, the ſacrament is ſaid to be *expoſed* when it is ſhown in public uncovered on feſtival days, and during the time of plenary indulgences.

EXPOSING is alſo uſed with a farther latitude: thus we ſay, It is prohibited to expoſe falſe and clipped money. Such a houſe ſtands very high, and has a delicious proſpect; but it is expoſed to all the four winds. Such a city being on the frontiers, and not fortified, is expoſed to the inſults of every party of forces.

EXPOSING of Children, a barbarous cuſtom practiſed by moſt of the ancients excepting the Thebans, who had an expreſs law to the contrary, whereby it was made capital to expoſe children; ordaining at the ſame time, that ſuch as were not in a condition to educate them ſhould bring them to the magiſtrates, in order to be brought up at the public expence. Among the other Greeks, when a child was born, it was laid on the ground; and if the father deſigned to educate his child, he immediately took it up; but if he forbore to do this, the child was carried away and expoſed. The Lacedemonians indeed had a different cuſtom: for with them all new-born children were brought before certain triers, who were ſome of the graveſt men in their own tribe, by whom the infants were carefully viewed; and if they were found luſty and well-favoured, they gave orders for their education, and allotted a certain proportion of land for their maintenance; but if weakly or deformed, they ordered them to be caſt into a deep cavern in the earth, near the mountain Taygetus, as thinking it neither for the good of the children themſelves nor for the public intereſt, that defective children ſhould be brought up. Many perſons expoſed their children only becauſe they were not in a condition to educate them, having no intention that they ſhould periſh. It was the unhappy fate of daughters eſpecially to be thus treated, as requiring more charges to educate and ſettle them in the world than ſons.

The parents frequently tied jewels and rings to the children they expoſed, or any other thing whereby they might afterwards diſcover them, if Providence took care for their ſafety. Another deſign in adorning theſe infants was either to encourage ſuch as found them to nouriſh and educate them, if alive; or to give them human burial if dead. The places where it was uſual to expoſe children were ſuch as people frequented moſt. This was done in order that they might be found, and taken up by compaſſionate perſons who were in circumſtances to be at the expence of their education. With this intention the Egyptians and

Romans choſe the banks of rivers, and the Greeks the highways.

EXPOSITION, in general denotes the ſetting a thing open to public view. See Exposing.

Exposition, in a literary ſenſe, the explaining an author, paſſage, writing, or the like, and ſetting their meaning in an obvious and clear light.

EXPOSITOR, or Expository, a title which ſome writers have given to a leſſer kind of dictionaries or vocabularies, ſerving to expound or explain the meaning of the obſcure or difficult words of a language. It is alſo uſed in the ſame ſenſe with commentary and paraphraſe.

EXPOSTULATION, in rhetoric, a warm addreſs to a perſon who has done another ſome injury, repreſenting the wrong in the ſtrongeſt terms, and demanding redreſs.

EXPOSURE, in gardening, the ſituation of a garden wall, or the like, with reſpect to the points of the compaſs, as ſouth or eaſt. See Gardening.

Ex-poſt-facto, in law, denotes ſomething done after another thing that was omitted before. An eſtate granted may be made good by matter *ex-poſt-facto*, that was not ſo at firſt by election, &c.

EXPRESSED oils, in chemiſtry, ſuch oils as are obtained from bodies only by preſſing. See Oil.

EXPRESSION, in rhetoric, the elocution, diction, or choice of words in a diſcourſe. See Language, Oratory, and Poetry.

Expression, in muſic. See Composition.

Expression, in painting, a natural and lively repreſentation of the ſubject, or of the ſeveral objects intended to be ſhown.

The expreſſion conſiſts chiefly in repreſenting the human body and all its parts, in the action ſuitable to it: in exhibiting in the face the ſeveral paſſions proper to the figures, and obſerving the motions they impreſs on the external parts. See Painting.

Expression Theatrical. See Declamation, article iv.

EXPRESSION, in medicine, chemiſtry, &c. the act of expreſſing or extracting the juices or oils of plants, fruits, or other matters, by ſqueezing, wringing, or preſſing them in a preſs. After having let the herbs infuſe a due time, their juice muſt be drawn by expreſſion in a linen cloth or by a preſs.

EXPULSION, in a general ſenſe, the act of violently driving a perſon out of any city, ſociety, &c.

Expulsion, in medicine, the act whereby any thing is forcibly driven out of the place in which it is: thus we ſay, the expulſion of the fetus in delivery.

EXSICCATION, (formed of *ex* and *ſiccus*, "dry,") in chemiſtry, &c. the act of drying up or evaporating the moiſture of a thing.

EXPIRATION, in phyſic, that part of reſpiration by which the air is expelled or driven out of the lungs. See Anatomy, n° 118. and Respiration.

EXSUDATION, or Exudation, the act of ſweating out. In which manner, gums, balſams, &c. are uſually produced from trees.

EXTANT, ſomething that ſtill ſubſiſts, or is in being. It is but part of the hiſtory of Livy, of the writings of Cicero, Cæſar, &c. that are extant, the reſt are loſt. We have nothing extant of Socrates, though he wrote a great deal.

EXTASY, a tranſport which ſuſpends the function of the ſenſes, by the intenſe contemplation of ſome extraordinary or ſupernatural object.

Extasy, in medicine, a ſpecies of catelepſy, when a perſon perfectly remembers, after the paroxyſm is over, the ideas he conceived during the time it laſted.

EXTENSION, in philoſophy, one of the common and eſſential properties of a body; or that by which it poſſeſſes or takes up ſome part of univerſal ſpace, which is called the place of that body. See Metaphysics, n° 56.

EXTENSOR, an appellation given to ſeveral muſcles, from their extending or ſtretching the parts to which they belong. See Anatomy, *Table of the Muſcles*.

EXTENT, in law, is uſed in a double ſenſe. Sometimes it ſignifies a writ or command to the ſheriff for the valuing of lands or tenements; and ſometimes the act of the ſheriff or other commiſſioner upon this writ.

Old and New Extent, in Scots law. See Law, N° clxvi. 6.

EXTENUATION, the act of diminiſhing or leſſening the bulk or ſubſtance of a thing, eſpecially of the human body. Fevers, agues, long abſtinences, &c. occaſion great extenuations or emaciations.

Extenuation, is alſo a figure in rhetoric, oppoſite to the hyperbole. The Greeks call it λιτοτης.

EXTERIOR, or External. See External.

EXTERMINATION, in general, the extirpating or deſtroying ſomething.

Exterminaticn, or Exterminating, in algebra, is uſed for taking away. Thus algebraiſts ſpeak of exterminating ſurds, fractions, and unknown quantities out of equations. See Maclaur. Algebr. part i. chap. 12. where we have ſome general theorems for the exterminating unknown quantities in given equations.

EXTERNAL, a term of relation applied to the ſurface or outſide of a body, or that part which appears or preſents itſelf to the eye, touch, &c. in contradiſtinction to internal.

External is alſo uſed to ſignify any thing that is without-ſide a man, or that is not within himſelf, particularly in his mind; in which ſenſe we ſay, external objects, &c.

EXTINCTION, in general, denotes the putting out or deſtroying ſomething, as a fire or flame. See *Extinguiſhing Fire*.

EXTINGUISHMENT, in law, is a conſolidation or union, as where one has due to him a yearly rent out of lands, and afterwards purchaſes the lands out of which the rent ariſes; in this caſe, both the property and the rent being united in one poſſeſſor, the rent is ſaid to be extinguiſhed.

EXTIRPATION, (formed of *ex* and *ſtirps*, "root") the act of pulling up or deſtroying a thing to the very roots. Among the prayers of the Romiſh jubilee, there is one for the extirpation of hereſy.

Extirpation is alſo uſed, in ſurgery, for cutting off any part entirely; as a wen, &c. or the eating it away, as a wart, &c. by corroſive medicines.

EXTISPEX, in antiquity, the perſon who drew preſages from viewing the intrails of animals offered in ſacrifice.

EXTORTION, in law, is an illegal manner of wreſting any thing from a man, either by force, menace,

nace, or authority. It is alſo the exaction of unlawful uſury, winning by unlawful games, and taking more than is due under pretence of right, as exceſſive tolls in millers, &c.

At the common law extortion is puniſhable by fine and impriſonment; and the ſtatute of 3 Eliz I. c. 30. has enacted, that officers of juſtice guilty of extortion for the expedition of buſineſs, &c. ſhall render to the party treble value. There are likewiſe divers other ſtatutes for puniſhing extortions of ſheriffs, bailiffs; gaolers, clerks of the aſſize and of the peace, attornies, ſolicitors, &c.

EXTRACT, in pharmacy, is a ſolution of the purer parts of a mixed body inſpiſſated by diſtillation or evaporation, nearly to the conſiſtence of honey.

Extract, in matters of literature, is ſomething copied or collected from a book or paper.

EXTRACTION, in chemiſtry and pharmacy, the operation by which eſſences, tinctures, &c. are drawn from natural bodies. See Extract.

Extraction, in ſurgery, is the drawing any foreign matter out of the body by the hand, or by the help of inſtruments. See Surgery.

Extraction, in genealogy, implies the ſtock or family from which a perſon is deſcended. See Descent.

Extraction of Roots, in algebra and arithmetic, the methods of finding the roots of given numbers or quantities. See Algebra and Arithmetic.

EXTRACTOR, in midwifery, an inſtrument or forceps for extracting children by the head.

EXTRAJUDICIAL, ſomething done out of the proper court, or the ordinary courſe of law. As when judgment is given in a cauſe or caſe, not depending in that court where ſuch judgment is given, or wherein the judge has no juriſdiction.

EXTRAORDINARII, amongſt the Romans, was a body of men conſiſting of a third part of the foreign horſe and a fifth of the foot, which was ſeparated from the reſt of the forces borrowed from the confederate ſtates with great policy and caution, to prevent any deſign that they might poſſibly entertain againſt the natural forces. A more choice body of men were drawn from among the extraordinarii under the name of *ablecti*. See Ablecti.

EXTRAORDINARY, ſomething out of the common courſe.

Extraordinary Couriers, are thoſe ſent expreſs on ſome urgent occaſion.

Extraordinary Ambaſſador, or envoy, is ſuch a one as is ſent to treat or negociate ſome ſpecial and important affair, as a marriage, a treaty, confederacy, &c. or even on occaſion of ſome ceremony, as condolence, congratulation, &c.

A gazette, journal, or other news-paper extraordinary, is that publiſhed after ſome great and notable event, containing the detail or particulars thereof, which are not found in the ordinary papers.

EXTRAVAGANTES, thoſe decretal epiſtles which were publiſhed after the Clementines.

They were ſo called, becauſe at firſt they were not digeſted or ranged with the other papal conſtitutions, but ſeemed to be, as it were, detached from the canon law. They continued to be called by the ſame name when they were afterwards inſerted in the body of the canon law. The firſt extravagantes are thoſe of John XXII. ſucceſſor of Clement V. The laſt collection was brought down to the year 1483, and was called the *common extravagantes*, notwithſtanding that they were likewiſe incorporated with the reſt of the canon law.

EXTRAVASATION, in contuſions, fiſſures, depreſſions, fractures and other accidents of the cranium, is when one or more of the blood-veſſels, that are diſtributed in the dura mater, is broke or divided, whereby there is ſuch a diſcharge of blood as greatly oppreſſes the brain and diſturbs its office; frequently bringing on violent pain and other miſchiefs; and at length death itſelf, unleſs the patient is timely relieved. See Surgery and Medicine.

EXTREME is applied to the laſt and outermoſt part of any thing; or that which finiſhes and terminates that ſide.

Extremes, in logic, denote the two extreme terms of the concluſion of a ſyllogiſm; viz. the predicate and ſubject. They are called *extremes*, from their relation to another term, which is a medium or mean between them. The predicate, as being likewiſe had in the firſt propoſition, is called the *majus extremum*, greater extreme; and the ſubject, as being put in the ſecond or minor propoſition, is called the *minus extremum*, leſſer extreme. Thus, in the ſyllogiſm, man is an animal; Peter is a man, therefore Peter is an animal; the word animal is the greater extreme, Peter the leſs extreme, and the man the medium. See Syllogism.

Extreme and mean proportion, in geometry, is when a line is ſo divided, that the whole line is to the greater ſegment, as that ſegment is to the other: Or, as Euclid expreſſeth it, when the line is ſo divided, that the rectangle under the whole line, and the leſſer ſegment, is equal to the ſquare of the greater ſegment.

Extreme Unction. See Unction.

EXTREMITIES of figures, in painting, is uſed for the head, hands, and feet. Theſe ſhould be drawn with more nicety and exactneſs, or more terminated than other parts; and thus help to render the action more expreſſive.

EXTRINSIC among metaphyſicians, is taken in various ſenſes. Sometimes it ſignifies a thing's not belonging to the eſſence of another; in which ſenſe, the efficient cauſe and end of a thing are ſaid to be extrinſic. Sometimes it ſignifies a thing's not being contained within the capacity of another; in which ſenſe, thoſe cauſes are called extrinſic which introduce ſomething into a ſubject from without, as when a fire introduces heat. Sometimes it ſignifies a thing added or applied to another; in which ſenſe accidents and adherents are ſaid to be extrinſic to the ſubjects to which they adhere. Sometimes the viſion is ſaid to be extrinſic from ſome form which does not exiſt in that thing but is adjacent to it, or by ſome means or other without it.

EXTUBERANCES, in medicine, are ſwellings or riſings up in the fleſh or other parts of the body.

EXUBERANCE, (compounded of *ex* and *uber* "plentiful") in rhetoric, a redundancy. See Redundance and Pleonasm.

EXUDATION. See Exsudation.

EXVERRÆ, in antiquity, a kind of bruſh uſed in cleanſing houſes out of which a dead perſon had been carried.

EXULCERATION, in medicine, the act of cauſing or producing ulcers. Thus, arſenic exulcerates the inteſtines; corroſive humours exulcerate the ſkin.

EXULCERATON is ſometimes uſed alſo for an ulcer itſelf; but more generally for thoſe beginning eroſions which wear away the ſubſtance, and form ulcers.

EXUVIÆ, among naturaliſts, denote the caſt-off parts or coverings of animals, as the ſkins of ſerpents, caterpillars, and other inſects.

EXUVIÆ is alſo uſed for ſome ſhells and other marine bodies, frequently found in the bowels of the earth; ſuppoſed to have been depoſited there at the deluge, as being the real ſpoils of once living creatures. See SHELL, FOSSLE, and DELUGE.

EY, in old writers, the ſame with *inſula* "an iſland;" from which comes *eyet*, a ſmall iſland or iſlet, vulgarly called *eyght*.

EYCK. See BRUGES (John of.)

EYE, in anatomy. See ANATOMY, n° 142.

A new-born child ſhall be obſerved, perhaps, never to keep its eyes fixed on any one object, but continually changing from one to another, and if you put your hand before them, the child will not wink. Hence ſome have thought, that new-born infants have no ſight: but this is a miſtake; and the true reaſon why their eyes are in perpetual motion is, that they have not yet acquired the habit of examining one thing at once with their eyes: their not winking at the approach of the hand, ariſes from their want of experience how eaſily their eyes may be hurt; but in a few days they get the habit of winking, ſo that afterwards their eyes do it ſpontaneouſly at the approach of danger.

Artificial eyes are made of concave plates of gold, ſilver, or glaſs, and are ſtained ſo as to reſemble the natural eye. They muſt, when fixed in the orbit, be taken out and cleaned every night, and replaced in the morning. If no more of a diſeaſed eye is removed than what is preternaturally projected, or if enough is left to preſerve the muſcles unhurt, the artificial eye will have a little motion from the muſcles that remain. If the eye does not fit well, it irritates and inflames the other eye; in which caſe lay it aſide, until one can be had that fits better.

Bull's EYE, in aſtronomy. See ALDEBARAN.

EYE of a Block, in naval affairs, that part of the rope-ſtrop which is faſtened to ſome neceſſary place in the ſhip: the ſtrop is a ſort of wreath or rope formed into a ring, and fixed round the block for the double convenience of ſtrengthening the block and faſtening it in any place where it is wanted.

EYE, in agriculture and gardening, ſignifies a little bud or ſhoot, inſerted into a tree by way of graft. See ENGRAFTING.

EYE of a Tree, a ſmall pointed knot to which the leaves ſtick, and from which the ſhoots or ſprigs proceed. See GEMMA.

EYE, a town of Suffolk, 22 miles from Ipſwich and 91 from London. It may be called an iſland, becauſe it is ſurrounded by a brook near the borders of Norfolk, in the road between Ipſwich and Norwich. It was incorporated by king John; has two bailiffs, 10 principal burgeſſes, 24 common council, a recorder and town-clerk. It is a mean-built place, with narrow ſtreets. The chief manufacture is bone-lace and ſpinning. Here is, however, a large handſome church; and near it are the ruinous walls of an ancient caſtle and monaſtery. The market is on Saturday, the fair on Whit-Monday. It has only ſent members to parliament ſince the reign of Edward IV.

EYE-Bright. See EUPHRASA.

EYMOUTH, a town of Scotland in the county of Berwick, formerly fortified to curb the garriſon of Berwick, from which place it is diſtant ſix miles W. Long. 1. 50. N. Lat. 55. 50. It gave title of baron in the kingdom of Scotland to Churchill, afterwards the great Duke of Marlborough; but he having no male iſſue, it became extinct in him.

EYRAC, or IRAC, ARABIA, a province of Turkey in Aſia, 345 miles in length, and 190 in breadth; of which BAGDAD is the capital.

EYRAC Agemi, the principal province of Perſia, anciently called PARTHIA.

EYRE, or EIRE, in law, the court of itinerant juſtices. See ASSIZE.

EYRIE, in falconry, a brood or neſt, a place where hawks build and hatch their young.

EZEKIEL, a canonical book of the Old Teſtament, referring chiefly to the degenerate manners and corruptions of the Jews of thoſe times. It abounds with fine ſentences and rich compariſons, and diſcovers a good deal of learning in profane matters.

Ezekiel was carried captive to Babylon with Jechoniah, and began his prophecies in the fifth year of the captivity. He was cotemporary with Jeremiah, who propheſied at the ſame time in Judea. He foretold many events, particularly the deſtruction of the temple, the fatal cataſtrophe of thoſe who revolted from Babylon to Egypt, and the happy return of the Jews to their own land.

EZION-GABER. See ASIONGABER.

EZRA, a canonical book of the Old Teſtament; comprehending the hiſtory of the Jews from the time of Cyrus's edict for their return, to the 20th year of Artaxerxes Longimanus. It ſpecifies the number of Jews who returned, and Cyrus's proclamation for the rebuilding the temple, together with the laying its foundation, the obſtruction it met with, and the finiſhing thereof in the reign of Darius.

The illuſtrious author of this book was alſo the reſtorer and publiſher of the canon of the Old Teſtament. See BIBLE.

The books of Ezra, called in the Engliſh verſion the *Firſt and Second Books of Eſdras*, though held by ſome, particularly the Greeks, for canonical, are thrown by the Engliſh church into the number of apocryphal books, being only extant in Greek.

F.

F, THE fourth conſonant, and ſixth letter of the alphabet. The letter F is borrowed from the digamma or double gamma of the Ælians, as is evident from the inſcription on the pedeſtal of the Coloſſus at Delos; and was undoubtedly formed from the old Hebrew vau: and though this letter is not found in the modern Greek alphabet, yet it was in the ancient one, from whence the Latins received it and tranſmitted it to us.

It is formed by a ſtrong expreſſion of the breath, and joining at the ſame time the upper-teeth and under-lip. It has but one ſort of ſound, which has a great affinity with *v* and *ph*, the latter being written for it by us in all Greek words, as *philoſophy*, &c. though the Italians write it *filoſofia*.

The Romans for ſome time uſed an inverted F, Ⅎ, inſtead of V conſonant, which had no peculiar figure in their alphabet. Thus, in inſcriptions we meet with TERMINAℲIT, DIℲI, &c. Lipſius and others ſay, that it was the emperor Claudius who introduced the uſe of the inverted digamma, or Ⅎ: but it did not long ſubſiſt after his death; for Quintilian obſerves, that it was not uſed in his time.

F, or FA, in muſic, is the fourth note riſing in this order of the gamut, *ut, re, mi, fa*. It likewiſe denotes one of the Greek keys in muſic, deſtined for the baſs.

F, in phyſical preſcriptions ſtands for *Fiat*, or "Let it be done." Thus *f. s. a.* ſignifies *fiat ſecundum artem*.

F was alſo a numeral letter, ſignifying 40; according to the verſe,

Sexta quaterdenos gerit quæ diſtat ab alpha.

And when a daſh was added at top, thus F̄, it ſignified forty thouſand.

F, in the civil law. Two f's joined together thus, *ff*, ſignify the pandects. See PANDECTS.

F, in criminal law, a ſtigma or brand put upon felons with a hot iron, on their being admitted to the benefit of clergy; by ſtat. 4 H. 7. c. 13.

FABA, in botany. See VICIA.

FABAGO, in botany; a ſpecies of bean-caper, or ZYGOPHYLLUM.

FABER, in ichthyology; a ſpecies of ZEUS.

FABIAN (Robert), an alderman of the city of London, and ſheriff in the year 1494; was a perſon of learning for the time he lived in, a good poet, and author of a Chronicle of England and France, intitled *The Concordaunce of Stories*, in two volumes folio, beginning with Brute, and ending with the 20th of Henry VII. 1504. It contains ſeveral curious particulars relative to the city of London, not elſewhere to be found. Stowe calls it "a painful labour, to the great honour of the city and of the whole realm." We are told that Cardinal Wolſey cauſed as many copies of this book as he could procure to be burned, becauſe the author had made too clear a diſcovery of the large revenues of the clergy. Fabian died in 1512.

FABII, a noble and powerful family at Rome, who derived their name from *faba*, a bean, becauſe ſome of their anceſtors cultivated this pulſe. They were once ſo numerous that they took upon themſelves to wage a war againſt the Veientes. They came to a general engagement near the Cremera, in which all the family, conſiſting of 306 men, were totally ſlain, year of Rome 277. There only remained one whoſe tender age had detained him at Rome, and from him aroſe the noble Fabii in the following ages.

FABIUS (Maximus Rullianus), was the firſt of the Fabii who obtained the ſurname of *Maximus*, for leſſening the power of the populace at elections. He was maſter of horſe, and his victory over the Samnites in that capacity nearly coſt him his life, becauſe he engaged the enemy without the command of the dictator. He was five times conſul, twice dictator, and once cenſor. He triumphed over ſeven different nations in the neighbourhood of Rome, and rendered himſelf illuſtrious by his patriotiſm.

FABIUS (Ruſticus), an hiſtorian in the age of Claudius and Nero. He was intimate with Seneca; and the encomiums which Tacitus paſſes upon his ſtyle, make us regret the loſs of his compoſitions.

Q. FABIUS (Maximus), a celebrated Roman, who from a dull and inactive childhood was raiſed to the higheſt offices of the ſtate. In his firſt conſulſhip he obtained a victory over Liguria, and the fatal battle of Thraſymenus occaſioned his election to the dictatorſhip. In this important office he began to oppoſe Hannibal, not by fighting him in the open field, like his predeceſſors, but he continually harraſſed his army by countermarches and ambuſcades, from which he received the ſurname of *Cunctator*, or *Delayer*. Hannibal ſent him word, that "If he was as great a captain as he would be thought, he ought to come into the plain and give him battle." But Fabius coldly replied, "That if he was as great a captain as he would be thought, he would do well to force him to fight." Such operations for the commander of the Roman armies gave offence to ſome; and Fabius was even accuſed of cowardice. He, however, continued firm in his firſt reſolutions; and patiently bore to ſee his maſter of horſe raiſed to ſhare the dictatorial dignity with himſelf, by means of his enemies at home. When he had laid down his office of dictator, his ſucceſſors, for a while, followed his plan; but the raſhneſs of Varro, and his contempt for the operations of Fabius, occaſioned the fatal battle of Cannæ. Tarantum was obliged to ſurrender to his arms after the battle of Cannæ; and on that occaſion the Carthaginian enemy obſerved that Fabius was the Hannibal of Rome. When he had made an agreement with Hannibal for the ranſom of the captives, which was totally diſapproved by the Roman ſenate, he ſold all his eſtates to pay the money, rather than forfeit his word to the enemy. The bold propoſals of young Scipio to go and carry the war from Italy to Africa, was rejected by Fabius as chimerical and dangerous. He did not, however, live to ſee the ſucceſs of the Roman arms under Scipio, and the conqueſt of Carthage by meaſures which he treated with contempt and heard with indignation. He died in the 100th year of his age, after he had been five times conſul, and twice honored with a triumph. The Romans were ſo ſenſible of his great merit and ſervices, that the expences of his funeral were defrayed from the public treaſury.—His ſon bore the ſame name, and ſhowed himſelf worthy of his noble father's virtues. During his conſulſhip he received a viſit from his father on horſeback in the camp. The ſon ordered the father to diſmount: and the old man cheerfully obeyed, embracing his ſon, and ſaying, "I wiſhed to know whether you knew what it is to be conſul." He died before his father, and Cunctator with the moderation of a philoſopher delivered a funeral oration over the dead body of his ſon.

FABIUS, ſtyled *Pictor*, a Roman general and hiſtorian. He firſt introduced painting at Rome, and having cauſed the walls of the temple of Health to be painted, ſome authors have erroneouſly reckoned him a painter. He died about 216 B. C.

FABLE, a tale, or feigned narration, deſigned either to inſtruct or divert, diſguiſed under the allegory of an action, &c.

Fables were the firſt pieces of wit that made their appearance in the world; and have continued to be highly valued, not only in times of the greateſt ſimplicity, but in the moſt polite ages of the world. Jotham's fable of the trees is the oldeſt that is extant, and as beautiful as any that have been made ſince. Nathan's fable of the poor man is next in antiquity. We find Æſop in the moſt diſtant ages of Greece; and in the early days of the Roman commonwealth, we read of a mutiny appeaſed by the fable of the belly and the members. As fables had their riſe in the very infancy of learning, they never flouriſhed more than when learning was at its greateſt height; witneſs Horace, Boileau, and Fontaine.

Fable is the fineſt way of giving counſel, and moſt univerſally pleaſing, becauſe leaſt ſhocking; for, in the reading of a fable, a man thinks he is directing himſelf, whilſt he is following the dictates of another, and conſequently is not ſenſible of that which is the moſt unpleaſing circumſtance in advice. Beſides, the mind is never ſo much pleaſed as when ſhe exerts herſelf in any action that gives her an idea of her own abilities; this natural pride of the ſoul is very much gratified in the reading of fable.

FABLE, is alſo uſed for the plot of an epic or dramatic poem; and is, according to Ariſtotle, the principal part, and, as it were, the ſoul of the poem. See POETRY.

FABRI (Honorius), a laborious Jeſuit born in the dioceſe of Bellay, diſtinguiſhed himſelf by his ſkill in philoſophy and the mathematics, and by writing a great number of books. The moſt curious of which treat of geometry, optics, the loadſtone, the motion of the earth, the ebbing and flowing of the ſea, &c. He died at Rome in 1688.

FABRIANO (Gentile da), painter of hiſtory, was born at Verona in 1332, and became a diſciple of Giovanni da Fieſole. In that early age of painting he rendered himſelf very famous, and was employed to adorn a great number of churches and palaces at Florence, Urbino, Siena, Peruſia, and Rome, but particularly in the Vatican; and one picture of his, repreſenting the Virgin and Child, attended by Joſeph, which is preſerved in the church of S. Maria Maggiore, was highly commended by Michael Angelo. By order of the Doge and Senate of Venice, he painted a picture in the great council-chamber, which was conſidered as ſo extraordinary a performance, that his employers granted him a penſion for life, and conferred on him the higheſt honour of their ſtate, which was, the privilege of wearing the habit of a noble Venetian. He died in 1412.

FABRIC, in general denotes the ſtructure or conſtruction of any thing; but particularly of buildings, as a church, hall, houſe, &c. See ARCHITECTURE.

FABRIC-Lands, thoſe formerly given towards rebuilding or repairing of cathedrals and other churches; for anciently almoſt every body gave more or leſs, by his will, to the fabric of the pariſh-church where he dwelt.

FABRICIUS (C.), a celebrated Roman, who in his firſt conſulſhip, year of Rome 470, obtained ſeveral victories over the Samnites and Lucanians, and was honored with a triumph. The riches which were acquired in thoſe battles were immenſe, the ſoldiers were liberally rewarded by the conſul, and the treaſury was enriched with 400 talents. Two years after, Fabricius went as ambaſſador to Pyrrhus, and refuſed with contempt preſents, and heard with indignation offers, which might have corrupted the fidelity of a leſs virtuous citizen. Pyrrhus had occaſion to admire the magnanimity of Fabricius; but his aſtoniſhment was more powerfully awakened when he ſaw him make a diſcovery of the perfidious offers of his phyſician, who pledged himſelf to the Roman general for a ſum of money to poiſon his royal maſter. To this greatneſs of ſoul was added the moſt conſummate knowledge of military affairs, and the greateſt ſimplicity of manners. Fabricius never uſed rich plate at his table. A ſmall ſalt-cellar, the feet of which were horn, was the only ſilver veſſel which appeared in his houſe. This contempt of luxury and uſeleſs ornaments Fabricius wiſhed to inſpire among the people; and during his cenſorſhip he baniſhed from the ſenate Cornelius Ruffinus, who had been twice conſul and dictator, becauſe he kept in his houſe more than ten pound weight of ſilver plate. Such were the manners of the conqueror of Pyrrhus, who obſerved that he wiſhed rather to command thoſe that had money, than poſſeſs it himſelf. He lived and died in the greateſt poverty. His body was buried at the public charge, and the Roman people were obliged to give a dowry to his two daughters when they had arrived to years of maturity.

FABRICIUS (George), a learned German, born at Chenmitz in Miſnia, in 1516. After a liberal education, he viſited Italy in quality of a tutor to a young nobleman; and, examining all the remains of antiquity with great accuracy, compared them with their deſcriptions in Latin writers. The reſult of theſe obſervations was his work intitled *Roma*, containing a deſcription of that city. He afterwards ſettled at Miſenum, where he conducted a great ſchool to the time of his death in 1571. He was alſo the author of a great number of ſacred Latin poems, wrote ſeven books of the *Annals of Miſnia*, three of the *Annals of Meiſſen*, and *Travels*.

FABRICIUS (Jerom), a celebrated phyſician in the latter end of the 16th century (ſurnamed *Aquapendente*, from the place of his birth), was the diſciple and ſucceſſor of Fallopius. He chiefly applied himſelf to ſurgery and anatomy, which he profeſſed at Padua for 40 years with extraordinary reputation. The republic of Venice ſettled a large penſion upon him, and honoured him with a gold chain and a ſtatue. He died in 1603; leaving behind him ſeveral works which are much eſteemed.

FABRICIUS (John Albert), one of the moſt learned and laborious men of his age, was born at Leipſic in 1668. He was choſen profeſſor of eloquence at Hamburgh in 1699, and was made doctor of divinity at Kiel. His works are numerous; and he died at Hamburgh in 1736, after a life ſpent in the ſevereſt literary application to collect and publiſh valuable remains of ancient learning.

FABRICIUS (Vincent), born at Hamburgh in 1613, was a good poet, a great orator, an able phyſician, and a learned civilian. He was for ſome time counſellor to the biſhop of Lubec, and afterwards burgomaſter and ſyndic of the city of Dantzic; from whence he was 13 times ſent deputy into Poland, where he died at Warſaw in 1657, during the diet of that kingdom. The moſt complete edition of Fabricius's poems and other works was publiſhed at Leipſic in 1685, under the direction of his ſon Frederic Fabricius.

FABRICIUS (Baron), one of the fineſt gentlemen of his time, and known to the public by his letters relating to the tranſactions of Charles XII. of Sweden during his reſidence in the Ottoman empire, was deſcended from a good family in Germany. He was taken early into the ſervice of the court of Holſtein: and was ſent in a public character to the king of Sweden whilſt he was at Bender; where he ſoon acquired the good graces of that prince. He accompanied him in his exerciſes; gave him a turn for reading; and it was out of his hand Charles ſnatched Boileau's ſatires, when he tore out thoſe that repreſented Alexander the Great as a madman. Fabricius was alſo in favour with Staniſlaus, and with king George I. whom he accompanied in his laſt journey to Hanover, and was with him when he died. A tranſlation of his letters was publiſhed in London 1761.

FABROT (Charles Hannibal), one of the moſt celebrated civilians of his time, was born at Aix in 1681; and acquired an extraordinary ſkill in the civil and canon law, and in the belles lettres. He publiſhed the *Baſilicæ*, or Conſtitutions of the Emperors of the Eaſt, in Greek and Latin, with learned notes, in ſeven vols folio; and editions of *Cedrenus*, *Nicetas*, *Anaſtaſius*, *Bibliothecarius*, *Conſtantine Manaſſes*, and *Cujas*, with learned and curious notes.

FABULOUS, ſomething conſiſting of, or connected with, a fable.

FABULOUS Age, among ancient hiſtorians. See AGE.

FACE, the ſurface, or firſt ſide which a body preſents to the eye. We ſay, the *face* of the earth, of the waters, &c. Polyhedrons have ſeveral *faces*. A die, or cube, has ſix *faces*.

FACE, is particularly uſed for the viſage of an animal, and eſpecially of man; and comprehends, in the latter, all that part of the head which is not covered with the common long hair. The Latins call it *facies*, *vultus*, *os*, &c.

The human face is called the *image of the ſoul*, as being the ſeat of the principal organs of ſenſe; and the place where the ideas, emotions, &c. of the ſoul are chiefly ſet to view. Pride and diſdain are ſhown in the eye-brows, modeſty on the cheeks, majeſty in the forehead, &c. It is the face ſhows the ſex, age, temperament, health, or diſeaſe, &c.

The face, conſidered as the index of the paſſions, habits, &c. of the perſon, makes the ſubject of phyſiognomy. See PHYSIOGNOMY.

FACE, among painters and artiſts, is uſed to denote a certain dimenſion of the human body, adopted for determining the proportion which the ſeveral parts ſhould bear to one another. See DRAWING.

FACE, in the military art, a word of command, intimating to turn about: thus, *face to the right*, is to turn upon the left heel a quarter-round to the right, and, *face to the left*, is to turn upon the right heel a quarter-round to the left.

FACIES HIPPOCRATICA, in medicine, is when the noſtrils are ſharp, the eyes hollow, the temples low, the tips of the ears contracted and cold, the forehead dry and wrinkled, and the complexion pale or livid.—The Hippocratic face is chiefly obſerved towards the period of phthiſes and other conſumptions, and is held a ſure prognoſtic of death. If it appears within three days after the attack of an acute diſeaſe, it is deemed to indicate death.

FACTION, a cabal or party formed in a ſtate, city, or company.

FACTION, in antiquity, a name given to the different companies of combatants in the circus. They were four, viz. the white, the red, the green, and the blue; to which Domitian added another of purple colour. They were ſo denominated from the colour of the liveries they wore; and were dedicated, according to M. Aur. Caſſiodorus, to the four ſeaſons of the year; the green being conſecrated to ſpring, the blue to winter, the red to ſummer, and the white to autumn. It appears from ancient inſcriptions, that each faction had its procurators and phyſician; and from hiſtory, that party-rage ran ſo high among them, that in a diſſenſion between two factions, in the time of Juſtinian, almoſt 40,000 men loſt their lives in the quarrel.

FACTITIOUS, any thing made by art, in oppoſition to what is the produce of nature. Thus, factitious cinnabar is oppoſed to native cinnabar.

FACTOR, in commerce, is an agent employed by merchants reſiding at other places, to buy or ſell goods, or negociate bills, or tranſact any kind of buſineſs on their account; and intitled to a certain allowance for his trouble.

A ſupercargo differs from a factor in this: The buſineſs of the former is limited to the care of a particular cargo; he goes along with it, and generally returns when his buſineſs is completed: the latter has a fixed reſidence abroad, and executes buſineſs for different merchants. But their duties, and the circumſtances for which they are accountable, are the ſame.

The duty of a factor is to procure the beſt intelligence of the ſtate of trade at his place of reſidence; of the courſe of exchange; of the quantity and quality of goods at market, their preſent price, and the probability that it may riſe or fall; to pay exact obedience to the orders of his employers; to conſult their advantage in matters referred to his direction; to execute their buſineſs with all the diſpatch that circumſtances admit; to be early in his intelligence, diſtinct in his accounts, and punctual in his correſpondence.

A factor's power is either abſolute or limited. Tho' intruſted with ample deſcretionary powers, he is not warranted to take unreaſonable or unuſual meaſures, or do any thing contrary to his employer's intereſt; but it is incumbent on the employer, if he challenge his proceedings, to prove that he could have done better, and was guilty of wilful miſmanagement.

When a factor's power is limited, he muſt adhere ſtrictly to his orders. If he exceeds his power, though with a view to his employer's intereſt he is liable for the conſequence. For example, if he gives a credit when not empowered, or longer credit if not empowered, for the ſake of a better price, and the buyer proves inſolvent, he is liable for the debt. A factor has no power to give credit unleſs authoriſed: But if the goods conſigned be generally ſold on credit at the place of conſignation, the factor will be vindicated for ſelling at the uſual credit, unleſs expreſsly reſtricted.

Although opinion will never juſtify the factor for departing from orders, neceſſity ſometimes will. If he be limited not to ſell goods under a certain price, and the goods be periſhable, and not in a ſituation for being kept, he may ſell them, to prevent their deſtruction, even under the price limited.

A factor is never warranted to deal on truſt, except with perſons in good credit at the time. If the employer challenge the debtors, it is incumbent on him to prove that their bad circumſtances was known at the time of ſale; and the factor will be vindicated, if he truſted them at the ſame time for goods of his own.

If the factor ſells his employor's goods on truſt, and, after the day of payment is elapſed, receive payment from the purchaſer for a debt of his own, he becomes liable in equity for the debt.

In caſe of bankruptcy, the factor ought immediately to lay attachments, and adviſe his employers; and he cannot withdraw his attachments, nor compound debts without orders.

If a factor ſells goods belonging to different merchants to the ſame perſon, and the buyer proves inſolvent, they ſhall bear the loſs in equal proportions; and, if the buyer has paid part before his inſolvency, without ſpecifying for which, the payment ought to be diſtributed in equal proportions; but, if the days of payment be fixed, and part of the debts only due, the payment ought to be applied, in the firſt place, to ſuch debts as were due.

If he makes a wrong entry at the cuſtom-houſe, and the goods be ſeized in conſequence thereof, he muſt bear the loſs, unleſs the error be occaſioned by a miſtake in the invoice, or letter of advice.

The owner bears the loſs of goods ſeized when attempted to be ſmuggled by his orders; but the factor complying with an unlawful order is liable in ſuch penalties as the laws exact.

If a factor ſaves the duty of goods due to a foreign prince, he ſhall have the benefit; for, if detected, he bears the loſs.

If a factor ſells goods bought by his employer's orders for his own advantage, the employer may recover the benefit, and the factor ſhall be amerced for the ſame.

If a factor receives bad money in payment, he bears the loſs; but if the value of the money be leſſened by the government, the employer bears the loſs.

A factor is not liable for goods ſpoiled, robbed, or deſtroyed by fire.

If a factor receives counterfeit jewels from his employer, and ſells them, the employer is liable to indemnify him for any penalties he may incur.

If a factor be ordered to make inſurance, and neglect it, and the ſubject be loſt, he is liable to make it good, providing he had effects in his hands.

If a factor buys goods for his employer, his bargain ſhall be binding on the employer.

In caſe of a factor's inſolvency, the owner may reclaim his goods; and, if they be ſold on truſt, the owner (and not the factor's creditors) ſhall recover payment of the debts.

FACTOR, in multiplication, a name given to the multiplier and multiplicand, becauſe they conſtitute the product. See ARITHMETIC.

FACTORAGE, called alſo *commiſſion*, is the allowance given to factors by the merchant who employs them.

A factor's commiſſion in Britain, on moſt kinds of goods, is 2½ *per cent.*: on lead, and ſome other articles, 2 *per cent.*; in Italy, 2½ *per cent.*, in France, Holland, Spain, Portugal, Hamburgh, and Dantzic, 2 *per cent.*; in Turkey, 3 *per cent.*; in North America, 5 *per cent.* on ſales, and 5 *per cent.* in returns; in the Weſt Indies, 8 *per cent.* for commiſſion and ſtorage. In ſome places, it is cuſtomary for the factors to inſure the debts for an additional allowance, generally 1½ *per cent.* In that caſe, they are accountable for the debt when the uſual term of credit is expired.

Factorage on goods is ſometimes charged at a certain rate per caſk, or other package, meaſure, or weight, eſpecially when the factor is only employed to receive or deliver them.

FACTORY is a place where a conſiderable number of factors reſide, to negociate for their maſters or employers. See FACTOR.

The moſt conſiderable factories belonging to the Britiſh are thoſe eſtabliſhed in the Eaſt-Indies, Portugal, Turkey, &c. There are alſo Engliſh factories eſtabliſhed at Hamburgh, Peterſburg, Dantzic, and in Holland; all endowed with certain privileges.

FACTUM, in arithmetic, the product of two quantities multiplied by each other.

FACULÆ, in aſtronomy, certain bright and ſhining parts, which the modern aſtronomers have, by means of teleſcopes, obſerved upon or about the ſurface of the ſun: they are but very ſeldom ſeen.—The word is pure Latin; being a diminutive of *fax*, "torch;" and ſuppoſed to be here applied from their appearing and diſappearing by turns.

FACULTY, in law, a privilege granted to a perſon, by favour and indulgence, of doing what, by law, he ought not to do.

For granting theſe privileges, there is a court under the archbiſhop of Canterbury, called the *court of the faculties*. The chief officer of this court is ſtyled *maſter of the faculties*, and has a power of granting diſpenſations in divers caſes; as, to marry without the bans being firſt publiſhed, to eat fleſh on days prohibited, to ordain a deacon under age, for a ſon to ſucceed his father in his benefice, a clerk to hold two or more livings, &c.

FACULTY, in the ſchools, a term applied to the different members of an univerſity, divided according to the arts and ſciences taught there: thus in moſt univerſities there are four faculties, viz. 1. Of arts, which include humanity and philoſophy. 2. Of theology. 3. Of phyſic. And, 4. Of civil law.

Faculty of Advocates. See ADVOCATES.

FACULTY is alſo uſed to denote the powers of the human mind, viz. underſtanding, will, memory, and imagination. See METAPHYSICS.

FÆCES, in chemiſtry, the groſs matter, or ſediment, that ſettles at the bottom after diſtillation, fermentation, and the like.—The fæces of wine are commonly called LEES.

FÆCES, in medicine, the excrements voided by ſtool. See EXCREMENTS.

FÆCULENT, in general, is applied to things abounding with fæces or dregs; thus the blood and other humours of the human body are ſaid to be fæculent, when without that purity which is neceſſary to health.

FAENZA, a city of Romania in Italy, with a biſhop's ſee. It is an ancient place, and has undergone various revolutions. The river Amona waſhes its walls, and paſſes between the city and the ſuburbs, which are joined by a ſtone-bridge defended by two good towers. The city is remarkable for its earthen ware, which is the beſt in all Italy.

FAERNUS (Gabriel), a native of Cremona in Italy, was an excellent Latin poet and critic of the 16th century. He was ſo ſkilled in all parts of polite literature, that the cardinal de Medicis, afterward Pope Pius IV. was particularly fond of him. He was the author of ſome Latin elegies; of 100 Latin fables, ſelected from the ancients, written in iambic verſe; and of ſeveral pieces of criticiſm, as *Cenſura emendationum Livianarum*, *De Metris Comicis*, &c. He was remarkably happy in decyphering manuſcripts, and reſtoring ancient authors to their purity: he took ſuch pains with Terence in particular, that Bentley has adopted all his notes in the edition he gave of that writer. He died at Rome in 1561, and Thuanus, who wrote his eloge, ſays, that the learned world was greatly obliged to him, yet had been ſtill more ſo, if, inſtead of ſuppreſſing the then unknown fables of Phædrus, for fear of leſſening the value of his own Latin fables, written in imitation of Æſop, he had been content with imitating them. M. Perault, however, who tranſlated Faernus's fables into French, has defended him from this imputation, by affirming that the firſt MS. of Phædrus's fables, found in the duſt of an old library, was not diſcovered till about 30 years after Faernus's death.

FAGARA, IRON-WOOD: A genus of the monogynia order, belonging to the tetrandria claſs of plants; and in the natural method ranking under the 43d order, *Dumoſæ*. The calyx is quadrifid, the corolla tetrapetalous, and the capſule bivalved and monoſpermous. There are five ſpecies, all natives of the warm parts of America, riſing with woody ſtems more than 20 feet high. They are propagated by ſeeds; but in Great Britain muſt be kept continually in a ſtove.

FAGE (Raimond de la), an excellent deſigner and engraver, highly eſteemed by Carlo Maratti, was born at Toulouſe in 1648. He applied himſelf to deſigning, through inclination, in ſpite of his parents; and had no maſter nor any aſſiſtance: but his ſuperior talents ſupplied the want of them, and he became one of the beſt deſigners in Europe; but his performances on licentious ſubjects are the moſt eſteemed. It is reported of this artiſt, that he never made uſe of money, but contracted debts; and when the accounts were brought him, he drew upon the back of the bills, and bid the owners ſell the drawings to connoiſſeurs for the amount, by which they were generally great gainers. Several of thoſe drawings are in the cabinets of the curious. He led a looſe, depraved life; which his repeated debaucheries put an end to at the age of 42.

FAENSA, a city and biſhop's ſee of Italy, ſituated in the pope's territories, about 30 miles eaſt of Bologna: E. Long. 12. 38. and N. Lat. 44. 30.

FAGGOT, in times of popery in Britain, was a badge worn on the ſleeve of the upper garment of ſuch perſons as had recanted or abjured what was then termed *hereſy*; being put on after the perſon had carried a faggot, by way of penance, to ſome appointed place of ſolemnity. The leaving off the wear of this badge was ſometimes interpreted a ſign of apoſtacy.

FAGGOTS, among military men, perſons hired by officers, whoſe companies are not full, to muſter and hide the deficiences of the company; by which means they cheat the king of ſo much money.

FAGIUS (Paul), *alias* BUCHLIN, a learned Proteſtant miniſter, born at Rheinzabem in Germany in 1504. He was a ſchoolmaſter at Iſna; but afterwards became a zealous preacher, and wrote many books. The perſecution in Germany menacing danger to all who did not profeſs the Romiſh doctrines, he and Bucer came over to England in 1549, at the invitation of archbiſhop Cranmer, to perfect a new tranſlation of the ſcriptures. Fagius took the old Teſtament, and Bucer the New, for their reſpective parts; but the deſign was at that time fruſtrated by the ſudden deaths of both. Fagius died in 1550, and Bucer did not live above a year after. Their bodies were dug up and buried in the reign of queen Mary.

FAGONIA, in botany: A genus of the monogynia order, belonging to the decandria claſs of plants; and in the natural method ranking under the 14th order, *Gruinales*. The calyx is pentaphyllous; the petals are five and heart-ſhaped; the capſule is quinquelocular, ten-valved, with the cells monoſpermous. There are three ſpecies, natives of Spain, Crete, and Arabia.

FAGOPYRUM, or BUCK-WHEAT. See POLYGONUM.

FAGUS, the BEECH-TREE: A genus of the polyandria order, belonging to the monoecia claſs of plants; and in the natural method ranking under the 50th order, *Amentaceæ*. The male calyx is quinquefid and campanulated; there is no corolla; the ſtamina are 12: The female calyx is quinquedentated; there is no corolla; there are three ſtyles; the capſule (formerly the calyx) is muricated and quadrivalved; the ſeeds, two in number. There are three ſpecies. 1. The ſylvaticus, or beech-tree, riſes 60 or 70 feet high, and has a proportionable thickneſs, branching upward into a fine regular head, garniſhed with oval ſerrated leaves, with flowers in globular catkins, ſucceeded by angular fruit called *maſt*. 2. The caſtanea, or cheſnut-tree, hath a large upright trunk growing 40 or 50 feet high, branching regularly round into a fine ſpreading head, garniſhed with large ſpear-ſhaped acutely ſerrated leaves naked on the under ſide, having flowers in long amentums, ſucceeded by round prickly fruit, containing two or more nuts. 3. The pumila, dwarf cheſnut-tree, or chinkapin, riſes eight or ten feet high, with a branching ſhrubby ſtem, and oval ſpear-ſhaped and acutely ſerrated leaves, hoary on the under ſide.

Culture. The firſt is very eaſily raiſed from the maſt or ſeed. “For woods (ſays Evelyn), the beech muſt be governed as the oak:—In nurſeries, as the aſh; ſowing the maſts in autumn, or later, even after January, or rather nearer the ſpring, to preſerve them from vermin, which are very great devourers of them. But they are likewiſe to be planted of young ſeedlings to be drawn out of the places where the fruitful trees abound.” Millar ſays, the ſeaſon for ſowing the maſts “is any time from October to February, only obſerving to ſecure the ſeeds from vermin when early ſowed, which, if carefully done, the ſooner they are ſown the better, after they are fully ripe.” Hanbury orders a ſufficient quantity of maſts to be gathered about the middle of September, when they begin to fall: theſe are to be “ſpread upon a mat in an airy place ſix days to dry; and after that you may either proceed to ſow them immediately, or you may put them up in bags in order to ſow them nearer the ſpring; which method I would rather adviſe, as they will keep very well, and there will be leſs danger of having them deſtroyed by mice or other vermin, by which kinds of animals they are greatly reliſhed.” They muſt be ſown in beds properly prepared about an inch deep. In the firſt ſpring many of the young plants will appear, whilſt others will not come up till the ſpring following. Having ſtood two years in the ſeminary, they ſhould be removed to the nurſery, where they may remain till wanted.

The propagation of the ſecond ſpecies is alſo chiefly from ſeeds. Evelyn ſays, “Let the nuts be firſt ſpread to ſweat, then cover them in ſand; a month being paſt, plunge them in water, and reject the ſwimmers; being dried for 30 days more, ſand them again, and to the water-ordeal as before. Being thus treated until the beginning of ſpring or in November, ſet them as you would do beans; and, as ſome practiſe it, drenched for a night or more in new milk; but with half this preparation they need only to be put into the holes with the point upmoſt, as you plant tulips. If you deſign to ſet them in winter or autumn, I counſel you to inter them in their huſks, which being every way armed, are a good protection againſt the mouſe, and a providential integument.”—“Being come up, they thrive beſt unremoved, making a great ſtand for at leaſt two years upon every tranſplanting; yet if needs you muſt alter their ſtation, let it be done about November.” Millar cautions us againſt purchaſing foreign nuts that have been kiln-dried, which (he ſays) is generally done to prevent their ſprouting in their paſſage; therefore he adds, “If they cannot be procured freſh from the tree, it will be much better to uſe thoſe of the growth of England, which are full as good to ſow for timber or beauty as any of the foreign nuts, though their fruit is much ſmaller.” He alſo recommends preſerving them in ſand, and proving them in water. In ſetting theſe ſeeds or nuts (he ſays) “the beſt way is to make a drill with a hoe (as is commonly practiſed for kidney-beans) about four inches deep, in which you ſhould place the nuts at about four inches diſtance, with their eye uppermoſt; then draw the earth over them with a rake, and make a ſecond drill at about a foot diſtance from the former, proceeding as before, allowing three or four rows in each bed.—In April (he does not mention the time of ſowing) theſe nuts will appear above ground; you muſt therefore obſerve to keep them clean from weeds, eſpecially when young: in theſe beds they may remain for two years, when you ſhould remove them into a nurſery at a wider diſtance. The beſt time for tranſplanting theſe trees is either in October or the latter end of February, but October is the beſt ſeaſon: the diſtance theſe ſhould have in the nurſery is three feet row from row, and one foot in the rows. If theſe trees have a downright tap-root, it ſhould be cut off, eſpecially if they are intended to be removed again: this will occaſion their putting out lateral ſhoots, and render them leſs ſubject to miſcarry when they are removed for good. The time generally allowed them in the nurſery is three or four years, according to their growth; but the younger they are tranſplanted, the better they will ſucceed. Young trees of this ſort are very apt to have crooked ſtems; but when they are tranſplanted out and have room to grow as they increaſe in bulk they will grow more upright, and their ſtems will become ſtraight, as I have frequently obſerved where there have been great plantations.”—Hanbury follows Millar almoſt literally; except that he mentions February as the time of ſowing; and recommends that the young plants, a year after they have been planted in the nurſery, be cut down to within an inch of the ground; which (he ſays) “will cauſe them to ſhoot vigorouſly with one ſtrong and ſtraight ſtem.” There is one material objection againſt ſowing cheſnuts in drills, which are well known to ſerve as guides or conductors to the field-mouſe, who will run from one end to the other of a drill without letting a ſingle nut eſcape her: we rather recommend ſetting them with a dibble, either promiſcuouſly or a quincunx, at about ſix inches diſtance. Evelyn ſays, that coppices of cheſnuts may be thickened by layering the tender young ſhoots; but adds, that “ſuch as ſpring from the nuts and marrons are beſt of all.” There is a ſtriped-leaved variegation which is continued by budding; and the French are ſaid to graft cheſnuts for their fruit; but Millar ſays, ſuch grafted tree are unfit for timber. The cheſnuts will thrive upon almoſt any ſoil which lies out of the water's way; but diſaffects wet moory land.

The method of propagating the dwarf cheſnut is from ſeeds, which we receive from America. Theſe ſhould be planted in drills, as ſoon as they arrive, in a moiſtiſh bed of rich garden-mould. If the ſeeds are good, they will come up pretty ſoon in the ſpring. After they appear, they will require no trouble, except keeping them clean from weeds, and watering them in dry weather. They may ſtand in the ſeed-bed two years, and be afterwards planted in the nurſery-ground, at a foot aſunder and two feet diſtance in the rows; and here when they are got ſtrong plants, they will be fit for any purpoſe.

Properties and Uſes. In ſtatelineſs and grandeur of outline, the beech vies with the oak. Its foliage is peculiarly ſoft and pleaſing to the eye; its branches are numerous and ſpreading; and its ſtem waxes to a great ſize. The bark of the beech is remarkably ſmooth, and of a ſilvery caſt; this, added to the ſplendor and ſmoothneſs of its foliage, gives a ſtriking neatneſs and delicacy to its general appearance. The beech, therefore, ſtanding ſingly, and ſuffered to form its own natural head, is highly ornamental; and its leaves varying their hue as the autumn approaches, renders it in this point of view ſtill more deſirable. In point of actual uſe the beech follows next to the oak and the aſh: it is almoſt as neceſſary to the cabinet-makers and turners (eſpecially about the metropolis), as the oak is to the ſhip-builder, or the aſh to the plough and cart-wright. Evelyn nevertheleſs condemns it in pointed and general terms; becauſe "where it lies dry, or wet and dry, it is exceedingly obnoxious to the worm." He adds, however, "but being put ten days in water, it will exceedingly reſiſt the worm." The natural ſoil and ſituation of the beech is upon dry, chalky, or limeſtone heights: It grows to a great ſize upon the hills of Surry and Kent; as alſo upon the declivities of the Cotſwold and Stroudwater hills of Glouceſterſhire, and flouriſhes exceedingly upon the bleak banks of the Wye, in Hereford and Monmouthſhires, England; where it is much uſed in making charcoal. In ſituations like thoſe, and where it is not already prevalent, the beech, whether as a timber-tree or as an underwood, is an object worthy the planter's attention.

The maſt, or ſeeds, yield a good oil for lamps; and are a very agreeable food to ſquirrels, mice, and ſwine. The fat of ſwine fed with them, however, is ſoft, and boils away unleſs hardened by ſome other food. The leaves gathered in autumn, before they are much injured by the froſts, make much better matraſſes than ſtraw or chaff; and laſt for ſeven or eight years. The nuts, when eaten by the human ſpecies, occaſion giddineſs and headach; but when well dried and powdered, they make wholeſome bread. They are ſometimes roaſted and ſubſtituted for coffee. The poor people in Sileſia uſe the expreſſed oil inſtead of butter.

The *cheſnut tree* ſometimes grows to an immenſe ſize. The largeſt in the known world are thoſe which grow upon Mount Ætna in Sicily*. At Tortworth in Glouceſterſhire, is a cheſnut tree 52 feet round. It is proved to have ſtood there ever ſince the year 1150, and was then ſo remarkable that it was called the *great cheſnut of Tortworth*. It fixes the boundary of the manor, and is probably near 1000 years old. As an ornamental, the cheſnut, though unequal to the oak, the beech, and the eſculus, has a degree of greatneſs belonging to it which recommends it ſtrongly to the gardener's attention. Its uſes have been highly extolled; and it may deſerve a conſiderable ſhare of the praiſe which has been given it. As a ſubſtitute for the oak it is preferable to the elm: For door-jambs, window-frames, and ſome other purpoſes of the houſe-carpenter, it is nearly equal to oak itſelf; but it is very apt to be ſhakey, and there is a deceitful brittleneſs in it which renders it unſafe to be uſed as beams, or in any other ſituation where an uncertain load is required to be borne. It is univerſally allowed to be excellent for liquor caſks; as not being liable to ſhrink, nor to change the colour of the liquor it contains: it is alſo ſtrongly recommended as an underwood for hop-poles, ſtakes, &c. Its fruit too is valuable, not only for ſwine and deer, but as a human food: Bread is ſaid to have been made of it. Upon the whole, the cheſnut, whether in the light of ornament or uſe, is undoubtedly an object of the planter's notice.

FAINT-ACTION, in law, a feigned action, or ſuch as, although the words of the writ are true, yet, for certain cauſes, the plaintiff has no title to recover thereby.

FAINT-Pleader, in law, a covinous, falſe, or colluſory manner of pleading, to the deceit of a third perſon.

FAINTING. See LIPOTHYMIA.

FAINTS, in the diſtillery, the weak ſpirituous liquor that runs from the ſtill in rectifying the low wines after the proof-ſpirit is taken off.

FAINTS, is alſo the laſt running of all ſpirits diſtilled by the alembic. The clearing the worm of theſe is ſo eſſential a point in order to the obtaining a pure ſpirit by the ſubſequent diſtillation, that all others are fruitleſs without it.

FAIR, a greater kind of market, granted to a town, by privilege, for the more ſpeedy and commodious providing of ſuch things as the place ſtands in need of.

The word fair is formed from the French *foire*, which ſignifies the ſame thing; and *foire* is by ſome derived from the Latin *forum*, "market;" by others from the Latin *feriæ*, becauſe anciently fairs were always held in the places where the wakes or feaſts of the dedications of churches, called *feriæ*, were held. See FERIÆ.

It is incident to a fair, that perſons ſhall be free from being arreſted in it for any other debt or contract than what was contracted in the ſame; or, at leaſt, promiſed to be paid there. Theſe fairs are generally kept once or twice a year; and, by ſtatute, they ſhall not be held longer than they ought, by the lords thereof, on pain of their being ſeized into the king's hands, &c. Alſo proclamation is to be made, how long they are to continue; and no perſon ſhall ſell any goods after the time of the fair is ended, on forfeiture of double the value, one fourth to the proſecutor and the reſt to the king. There is a toll uſually paid in fairs on the ſale of things, and for ſtallage, picage, &c.

Fairs abroad are either free, or charged with toll and impoſt. The privileges of free fairs conſiſt chiefly, firſt, in that all traders, &c. whether natives or foreigners, are allowed to enter the kingdom, and are under the royal protection, exempt from duties, impoſitions,

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* See *Etna*, nº 18. and Plate CLXXXV

poſitions, tolls, &c. Secondly, that merchants, in going or returning, cannot be moleſted or arreſted, or their goods ſtopped. They are eſtabliſhed by letters-patent from the prince. Fairs, particularly free fairs, make a very conſiderable article in the commerce of Europe, eſpecially that of the Mediterranean, and inland parts of Germany, &c.

The moſt celebrated fairs in Europe are thoſe, 1. Of Francfort, held twice a-year, in ſpring and autumn: the firſt commencing the Sunday before Palm-Sunday, and the other on the Sunday before the eighth of September. Each laſts 14 days, or two weeks; the firſt of which is called the *week of acceptance*, and the ſecond the *week of payment*. They are famous for the ſale of all kinds of commodities; but particularly for the immenſe quantity of curious books no where elſe to be found, and whence the bookſellers throughout all Europe uſed to furniſh themſelves. Before each fair, there is a catalogue of all the books to be ſold thereat, printed and diſperſed, to call together purchaſers: though the learned complain of divers unfair practices therein; as fictitious titles, names of books purely imaginary, &c. beſide great faults in the names of the authors, and the titles of the real books. —2. The fairs of Leipſic, which are held thrice a-year: one beginning on the firſt of January; another three weeks after Eaſter; and a third after Michaelmas. They hold 12 days a-piece; and are at leaſt as conſiderable as thoſe of Francfort. 3. The fairs of Novi, a little city in the Milaneſe, under the dominion of the republic of Genoa. There are four in the year, commencing on the ſecond of February, the ſecond of May, the firſt of Auguſt, and ſecond of September. Though the commodities bought and ſold here be very conſiderable; yet, what chiefly contributes to render them ſo famous, is the vaſt concourſe of the moſt conſiderable merchants and negociants of the neighbouring kingdoms, for the tranſacting of affairs and ſettling accounts. 4. The fairs of Riga, whereof there are two in the year; one in May, and the other in September. They are much frequented by the Engliſh, Dutch, and French ſhips, as alſo from all parts of the Baltic. The beſt time for the ſale of goods at Riga is during the fairs. Since the building of the famous city of Peterſburg, theſe fairs have ſuffered ſome diminution. 5. Fair of Archangel, during which all the trade foreigners have with that city is managed. It holds a month, or ſix weeks at moſt, commencing from the middle of Auguſt. The Muſcovite merchants attend here from all parts of that vaſt empire; and the Engliſh, Dutch, French, Sewdiſh, Daniſh, and other ſhips in the port of that city, on this occaſion, ordinarily amount to 300. But this is no free fair as the reſt are: The duties of exportation and importation are very ſtrictly paid, and on a very high footing. 6. The fair of St. Germain, one of the ſuburbs of Paris, commencing on the third of February, and holding till Eaſter; though it is only free for the firſt 15 days. 7. The fairs of Lyons, which Monſ. du Cheſne, in his antiquity of cities, would inſinuate, from a paſſage in Strabo, were eſtabliſhed by the Romans; though it is certain, the fairs, as they now ſtand, are of a much later date. There are three in the year, each laſting 20 days, and free for ever. They begin on Eaſter Monday, the 26th of July, and the firſt of December. 8. Fair of Guibray, a ſuburb of the city of Falaiſe, in the Lower Normandy. It is ſaid to have been eſtabliſhed by William the Conqueror, in conſideration of his being born at Falaiſe. It commences on the 16th of Auguſt; and holds 15 days free by charter, and longer by cuſtom. 9. Fair of Beaucaire, held partly in a city of that name, in Languedoc, and partly in the open country, under tents, &c. It commences on the 22d of July, and only holds for three days: yet it is the greateſt and moſt celebrated of all the fairs in that part of Europe, both for the concourſe of ſtrangers from all parts of the world, and for the traffic of all kind of goods: the money returned in theſe three days amounting ſometimes to above ſix millions of livres.

The fairs of Porto-bello, Vera Crux, and the Havanna, are the moſt conſiderable of all thoſe in America. The two firſt laſt as long as the flota and galleons continue in thoſe parts; and the laſt is opened as ſoon as the flota or galleons arrive there upon their return for Spain; this being the place where the two fleets join. See Flota, and Galleons.

The principal Britiſh fairs are, 1. Sturbridge-fair, near Cambridge, by far the greateſt in Britain, and perhaps in the world. 2. Briſtol has two fairs, very near as great as that of Sturbridge. 3. Exeter. 4. Weſt-Cheſter. 5. Edinburgh. 6. Wheyhill; and, 7. Burford-fair; both for ſheep. 8. Pancras fair, in Staffordſhire, for ſaddle-horſes. 9. Bartholemew fair, at London, for lean and Welch black cattle. 10. St. Faith's, in Norfolk, for Scotch runts. 11. Yarmouth fiſhing-fair for herrings, the only fiſhing fair in Great-Britain. 12. Ipſwich butter-fair. 13. Woodborough-hill, in Dorſetſhire, for weſt-country manufactures, as kerſeys, druggits, &c. 14. Two cheeſe fairs at Chipping Norton: with innumerable other fairs, beſides weekly markets, for all ſorts of goods, as well their own as of foreign growth.

Fair, in ſea language, is uſed for the diſpoſition of the wind, when it is favourable to a ſhip's courſe, in oppoſition to that which is contrary or foul. The term *fair* is more comprehenſive than *large*, and includes about 16 or 18 points of the compaſs; whereas large is confined to the beam or quarter, that is, to a wind which croſſes the keel at right angles, or obliquely from the ſtern, but never to one right a-ſtern.

Fair (Iſle), a ſmall iſland lying between Orkney and Shetland, 10 or 12 leagues E. N. E. from the former; and ſeven, eight, or 10 leagues, S. W. from the latter. It is three miles long, and ſcarce half a mile broad, very craggy, with three high rocks which are viſible both from Orkney and Shetland. There is in this iſland a ſmall quantity of arable land, which is very fruitful and well manured; and there might be conſiderably more, but the inhabitants are obliged to reſerve it for peat and paſturage. They have for the ſize of the iſland a great many ſheep, and thoſe very good and fat: but they have no kind of moor-fowl or other game; but there is great plenty of ſea and water fowl, and all kinds of fiſh upon their coaſts. There is in effect no port, though they have two that are nominally ſo: one at the ſouth end, which is full of rocks, where only ſmall boats can lie, and that but indifferently; the other at the north-eaſt end, larger and ſafer in ſummer, ſo that it ſerves commodiouſly enough for their

their fiſhery. The duke of Medina Sidonia, when commander of the famous Spaniſh armada in 1588, was wrecked on the eaſt coaſt of this iſland. The ſhip broke to pieces, but the duke and 200 men made their eſcape. They lived there ſo long, that both they and the inhabitants were almoſt famiſhed. At length the duke and the poor remains of his people were carried over to the main land of Shetland, and then to Dunkirk, by one Andrew Humphry, for which ſervice Andrew was rewarded with 3000 merks. This iſland produced to its former proprietor between 50 l. and 60 l. Sterling. It was ſold at Edinburgh, on the 20th of June 1766, for about 850 l. to James Stewart of Burgh, Eſq.

Fair-Curve, is a winding line, uſed in delineating ſhips, whoſe ſhape is varied, according to the part of the ſhip which it is intended to deſcribe.

Fair-Way, in ſea language, the path or channel of a narrow bay, river, or haven, in which ſhips uſually advance in their paſſage up and down; ſo that if any veſſels are anchored therein, they are ſaid to lie in the fair-way.

FAIRFAX (Edward,) natural ſon of Sir Thomas Fairfax, was an Engliſh poet who lived in the reigns of Elizabeth and James I. He wrote ſeveral poetical pieces, and was an accompliſhed genius. Dryden introduces Fairfax with Spencer, as the leading writers of the times; and even ſeems to give the preference to the former in the way of harmony, when he obſerves that Waller owned himſelf indebted for the harmony of his numbers to Fairfax's *Godfrey of Boulogne*. He died about the year 1632, at his own houſe called *New-hall*, in the pariſh of Fuyſton, between Denton and Knareſborough, and lies under a marble ſtone.

Fairfax (Sir Thomas), general of the parliamentary forces againſt Charles I. in 1644. See (*Hiſtory of*) Britain, n° 127. *et ſeq.* He reſigned in 1650; after which he lived privately, till he was invited by general Monk to aſſiſt him againſt Lambert's army. He cheerfully embraced the occaſion; and, on the third of December 1659, appeared at the head of a body of gentlemen of Yorkſhire; when, upon the reputation of his name, a body of 12,000 men forſook Lambert and joined him. He was at the head of the committee appointed by the Houſe of Commons to attend king Charles II. at the Hague, to deſire him ſpeedily to return to England; and having readily aſſiſted in his reſtoration, returned again to his ſeat in the country; where he lived in a private manner till his death, which happened in 1671, in the 60th year of his age.—He wrote, ſays Mr. Walpole, memorials of Thomas lord Fairfax, printed in 1699; and was not only an hiſtorian, but a poet. In Mr. Thoreſby's muſeum were preſerved in manuſcript the following pieces: The Pſalms of David, the Canticles, the Songs of Moſes, and other parts of Scripture, verſified; a poem on Solitude; Notes of Sermons, by his lordſhip, by his lady daughter of Horace lord Vere, and by their daughter Mary the wife of George the ſecond duke of Buckingham; and a Treatiſe on the Shortneſs of Life. But of all lord Fairfax's works, ſays Mr. Walpole, the moſt remarkable were the verſes he wrote on the horſe on which Charles II. rode to his coronation, and which had been bred and preſented to the king by his lordſhip. How muſt that merry monarch, unapt to keep his countenance on more ſerious occaſions, have ſmiled at this aukward homage from the old victorious hero of republicaniſm and the covenant! He gave a collection of manuſcripts to the Bodleian library.

FAIRFORD, a town in Glouceſterſhire, with a market on Thurſdays. It is remarkable for the church, which has curious painted glaſs-windows. They are ſaid to have been taken in a ſhip by John Tame, Eſq; towards the end of the 15th century, who built the church for their ſake. They are preſerved entire, and the figures are extremely well drawn and coloured. They repreſent the moſt remarkable hiſtories in the Old and New Teſtament. They are frequently viſited by travellers, and many go on purpoſe to view them, as one of the greateſt curioſities in England. The painter was Albert Durer. W. Long. 1. 46. N. Lat. 51. 42.

FAIRY, in ancient traditions and romances, ſignifies a ſort of deity, or imaginary genius, converſant on the earth, and diſtinguiſhed by a variety of fantaſtical actions either good or bad.

They were moſt uſually imagined to be women of an order ſuperior to human nature, yet ſubject to wants, paſſions, accidents, and even death; ſprightly and benevolent while young and handſome; moroſe, peeviſh, and malignant, if ugly, or in the decline of their beauty; fond of appearing in white, whence they are often called the *white ladies*.

Concerning theſe imaginary beings, no leſs a perſon than Jervaiſe of Tilleberry, marſhall of the kingdom of Arles, who lived in the beginning of the 13th century, writes thus in a work inſcribed to the emperor Otho IV. "It has been aſſerted by perſons of unexceptionable credit, that fairies uſed to chooſe themſelves gallants from among men, and rewarded their attachment with an affluence of worldly goods; but if they married, or boaſted of a fairy's favours, they as ſeverely ſmarted for ſuch indiſcretion." The like tales ſtill go current in Languedoc; and, throughout the whole province, there is not a village without ſome ancient ſeat or cavern which had the honour of being a fairy's reſidence, or at leaſt ſome ſpring where a fairy uſed to bathe. This idea of fairies has a near affinity with that of the Greeks and Romans, concerning the nymphs of the woods, mountains, and ſprings; and an ancient ſcholiaſt on Theocritus ſays, "The nymphs are demons which appear on the mountains in the figure of women:" and what is more ſurpriſing, the Arabs and other orientals have their *ginn* and *peri*, of whom they entertain the like notions.

But fairies have been likewiſe deſcribed as of either ſex, and generally as of minute ſtature, though capable of aſſuming various forms and dimenſions. The moſt charming repreſentation imaginable of theſe children of romantic fancy, is in the *Midſummer-night's Dream* of Shakeſpear; in referring to which, we will no doubt have been anticipated by the recollection of almoſt every reader.

Spenſer's Fairy Queen is an epic poem, under the perſons and characters of fairies. This ſort of poetry raiſes a pleaſing kind of horror in the mind of the reader, and amuſes his imagination with the ſtrangeneſs and novelty of the perſons who are repreſented in it; but, as a vehicle of inſtruction, the judicious object to it, as not having probability enough to make any moral impreſſion.

The belief of fairies ſtill ſubſiſts in many parts of Britain. The

> “Swart fairy of the mine,”

(of German extraction), has ſcarce yet quitted their ſubterraneous works; (*vid.* next article.) *Puck*, or *Robin Good-Fellow*, ſtill haunts many of their villages. And in the highlands of Scotland, new-born children are watched till the chriſtening is over, leſt they ſhould be ſtolen or changed by ſome of theſe fantaſtical exiſtences.

Fairy of the Mine; an imaginary being, an inhabitant of mines. The Germans believed in two ſpecies; one fierce and malevolent; the other a gentle race, appearing like little old men dreſſed like the miners, and not much above two feet high. Theſe wander about the drifts and chambers of the works; ſeem perpetually employed, yet do nothing; ſome ſeem to cut the ore, or fling what is cut into veſſels, or turn the windlaſs; but never do any harm to the miners, unleſs provoked; as the ſenſible Agricola, in this point credulous, relates in his book *de Animantibus Subterraneis*.

Fairy Circle or *Ring*, a phenomenon pretty frequent in the fields, &c. ſuppoſed by the vulgar to be traced by the fairies in their dances. There are two kinds of it; one of about ſeven yards in diameter, containing a round bare path, a foot broad, with green graſs in the middle of it. The other is of different bigneſs, encompaſſed with a circumference of graſs. Meſſ. Jeſſop and Walker, in the Philoſophical Tranſactions, aſcribe them to lightning; which is thought to be confirmed by their being moſt frequently produced after ſtorms of that kind, as well as by the colour and brittleneſs of the graſs roots when firſt obſerved. Lightning, like all other fires, moves round, and burns more in the extremity than in the middle: the ſecond circle ariſes from the firſt, the graſs burnt up growing very plentifully afterwards. Others maintain that theſe circles are made by ants, which are frequently found in great numbers therein.—Mr. Cavallo, who hath publiſhed an eſteemed treatiſe on electricity, does not think that lightning is at all concerned in the formation of them: “They are not (ſays he) always of a circular figure; and, as I am informed, they ſeem to be rather beds of muſhrooms than the effects of lightning.”

FAITH, in philoſophy and theology, that aſſent which we give to a propoſition advanced by another, the truth of which we do not immediately perceive from our own reaſon or experience; or it is a judgment or aſſent of the mind, the motive whereof is not any intrinſic evidence, but the authority or teſtimony of ſome other who reveals or relates it. Hence, as there are two kinds of authorities and teſtimonies, the one of God, and the other of man, faith becomes diſtinguiſhed into divine and human.

Divine Faith, is that founded on the authority of God; or it is that aſſent we give to what is revealed by God.

The objects of this faith, therefore, are matters of revelation. See Revelation and Religion.

Human Faith, is that whereby we believe what is told us by men. The object hereof is matter of human teſtimony and evidence. See Metaphysics.

Faith, in practical theology, makes the firſt of the theological virtues or graces.

Faith in God, in this ſenſe, denotes ſuch a conviction of his being, perfections, character, and government, as produces love, truſt, worſhip, obedience, and reſignation.

Faith in Chriſt, as it has been defined by ſome, is a mere aſſent to the goſpel as true; according to others, it ſignifies ſuch a perſuaſion that he is the Meſſiah, and ſuch a deſire and expectation of the bleſſings which he has promiſed in his goſpel to his ſincere diſciples, as engage the mind to fix its dependence upon him, and ſubject itſelf to him in all the ways of holy obedience. See Theology.

Faith, likewiſe, in reſpect to futurity, is a moral principle, implying ſuch a conviction of the reality and importance of a future ſtate, as is ſufficient to regulate the temper and conduct.

Faith, or *Fidelity*, (*Fides*), was deified by the ancient Romans, and had a temple in the Capitol conſecrated to her by Attilius Catalinus. Her prieſts wore white veils: unbloody ſacrifices were offered to her, and the greateſt oaths were taken in her name. Horace clothes her in white, places her in the retinue of Fortune, and makes her the ſiſter of Juſtice, *Od.* 24, 35. l. i. Public faith is repreſented in a great number of medals; ſometimes with a baſket of fruit in one hand, and ſome ears of corn in the other; and ſometimes holding a turtle-dove. But the moſt uſual ſymbol is two hands joined together. The inſcriptions are generally, *Fides Auguſti*, *Fides Exercitus*, or *Fides Militum*, &c.

FAITHFUL, an appellation aſſumed by the Mahometans. See Mahometans.

FAITHORN (William), an ingenious Engliſh artiſt, a native of London, was the diſciple of Peak the painter, and worked with him three or four years. At the breaking out of the civil war, Peak eſpouſed the cauſe of his ſovereign; and Faithorn, who accompanied his maſter, was taken priſoner by the rebels at Baringhouſe, from whence he was ſent to London, and confined in Alderſgate. In this uncomfortable ſituation he exerciſed his graver; and a ſmall head of the firſt Villars duke of Buckingham, in the ſtyle of Melan, is reckoned among his performances at that time. The ſolicitations of his friends in his favour at laſt prevailed; and he was releaſed from priſon, with permiſſion to retire to the continent. In France he found protection and encouragement from the Abbé de Marolles; and at this time it was that he formed an acquaintance with Nanteuil, from whoſe inſtructions he derived very conſiderable advantages. About the year 1650 he returned to England, and ſoon after married the ſiſter of a Captain Cround. By her he had two ſons; Henry, who was a bookſeller, and William an engraver in mezzotinto. Faithorn opened a ſhop near Temple-Bar, where he ſold not only his own engravings, but thoſe of other Engliſh artiſts, and imported a conſiderable number of prints from Holland, France, and Italy. About the year 1680, he retired from his ſhop, and reſided in Printing-Houſe Yard; but he ſtill continued to work for the bookſellers, eſpecially Royſton, Martin, and Peake the younger, his former maſter's brother. He painted portraits from the life in crayons; which art he learned of Nanteuil during his abode in France. He alſo painted in miniature; and his performances in both theſe ſtyles were much eſteemed. His ſpirits were broken by the indiſcretion and diſſipation of his ſon William; and a lingering conſumption put an end to his life in 1691. He wrote a book *Upon Drawing, Graving, and Etching*, for which he was celebrated by his friend Thomas Flatman the poet.

FAKIRS, Indian monks or friars. They out-do the ſeverity and mortification of the ancient Anchorets or Solitaries. Some of them make a vow of continuing all their lifetime in one poſture, and keep it effectually. Others never lie down; but continue in a ſtanding poſture all their lives, ſupported only by a ſtick, or rope under their arm-pits. Some mangle their bodies with ſcourges and knives. They look upon themſelves to have conquered every paſſion, and triumphed over the world; and accordingly ſcruple not, as if in a ſtate of innocence, to appear entirely naked in public.

The common people of Eaſt India are thoroughly perſuaded of the virtue and innocence of the fakirs; notwithſtanding which, they are accuſed of committing the moſt enormous crimes in private.

They have alſo another kind of fakirs, who do not practiſe ſuch ſeverities: theſe flock together in companies, and go from village to village, propheſying, and telling fortunes. They are wicked villains, and it is dangerous for a man to meet them in a lone place: nevertheleſs the Indian idolaters have them in the utmoſt veneration. They make uſe of drums, trumpets, and other muſical inſtruments, to rouſe their ſouls, and work themſelves up to an artificial ecſtaſy, the better to publiſh their pretended prophecies.

Some of the votaries of theſe ſages moſt devoutly kiſs their privy parts; and they receive this monſtrous declaration of reſpect with a kind of ecſtatic pleaſure. The moſt ſober and diſcreet Indians conſult them in this prepoſterous attitude; and their female votaries converſe with them a conſiderable time with the moſt indecent freedom.

The fire they burn is made of cow's dung, dried in the ſun. When they are diſpoſed to ſleep, they repoſe themſelves on cow's dung, and ſometimes on ordure itſelf. They are ſo indulgent towards every living creature, that they ſuffer themſelves to be over-run with vermin, or ſtung by inſects, without the leaſt reluctancy or complaint.

It is more than probable, theſe Indian friars have ſome ſecret art to lull their ſenſes aſleep, in order to render themſelves in a great meaſure inſenſible of the exceſſive torments they voluntarily undergo. Ovington aſſures us, that "as he was one day in an aſſembly of fakirs, he obſerved that they drank opiates infuſed in water; the intoxicating virtue whereof was enough to turn their brain."

The garment of the chief fakirs conſiſts of three or four yards of orange-coloured linen, which they tie round them, and a tyger's ſkin, which hangs over their ſhoulders. Their hair is woven in treſſes, and forms a kind of turban. The ſuperior of the fakirs is diſtinguiſhed from the reſt by having a greater number of pieces in his garment, and by a chain of iron, two yards long, tied to his leg. When he deſigns to reſt in any place, a garment is ſpread upon the ground; on which he ſits and gives audience, whilſt his diſciples publiſh his virtues.

Some perſons of quality in India have become fakirs: among others, five great lords belonging to the court of Cha-gehan, Mogul of the Indies. It is ſaid, there are about two millions of fakirs in the Eaſt Indies.

FALASHA, a people of Abyſſinia, of Jewiſh origin, deſcribed by Mr Bruce, who was at great pains to acquaint himſelf with their hiſtory by cultivating the friendſhip of the moſt learned perſons among them he could meet with.

According to the accounts received from them, the Falaſha are the deſcendants of thoſe Jews who came from Paleſtine into Ethiopia, as attendants of Menilek the ſon of the queen of Sheba or Saba by Solomon. They agree in the relations given by the Abyſſinians of that princeſs, which are mentioned under the article ETHIOPIA; but deny that the poſterity of thoſe who came with Menilek ever embraced the Chriſtian religion, as the Abyſſinians ſay they did. They ſay, that at the decline of the Jewiſh commerce, when the ports of the Red Sea fell into the hands of other nations, and no intercourſe took place betwixt them and Jeruſalem, the Jewiſh inhabitants quitted the ſea-coaſts and retired into the province of Dembea. While they remained in the cities on the Red Sea, they exerciſed the trades of brick and tile making, pottery, thatching houſes, &c. and after leaving the ſea-coaſts, they choſe the country of Dembea on account of the plenty of materials it afforded for exerciſing the trades they profeſſed. Here they carried the art of pottery to a great degree of perfection, multiplied exceedingly, and became very numerous and powerful about the time that the Abyſſinians were converted to Chriſtianity. As this event was accounted by them an apoſtacy from the true religion, they now ſeparated themſelves from the Abyſſinians, and declared one Phineas, of the line of Solomon, their king. Thus they ſay, they have ſtill a prince of the houſe of Judah for their ſovereign, though their aſſertion is treated with contempt, and a nick-name beſtowed on the Falaſhan family by the other Abyſſinians. About the year 960, the queen of this people, after extirpating the Abyſſinian princes on the rock Damo, aſſumed the ſovereignty of the whole empire, which they retained for ſome time, as is related under the article ETHIOPIA; but their power being by degrees reduced, they were obliged to take up their reſidence among the rugged mountains of Samen; one of which they choſe for their capital, and which has ever ſince been called the *Jews Rock*. About the year 1600, they were almoſt entirely ruined by an overthrow from the Abyſſinians, in which both their king and queen were ſlain; ſince which time they have been in ſubjection to the emperors of that country, but are ſtill governed by their own princes. When Mr Bruce was in Abyſſinia they were ſuppoſed to amount to about 100,000 effective men. Gideon and Judith were the names of the king and queen at that time; and theſe, according to our author ſeem to be preferred to others for the royal family.

The language of this people is very different from the Hebrew, Samaritan, or any other which the Jews ever ſpoke in their own country. On being interrogated concerning it by Mr Bruce, they ſaid, that it was probably one of thoſe ſpoken by the nations on the Red Sea, among whom they had ſettled at their firſt coming. They arrived in Abyſſinia ſpeaking Hebrew, and with the advantage of having books in that language; but had now forgot it, which indeed is not to be wondered at, as they had loſt their Hebrew books, and were entirely ignorant of the art of writing. At the time of their leaving Jeruſalem, they were in poſſeſſion both of the Hebrew and Samaritan copies of the law; but when their fleet was deſtroyed in the time of Rehoboam, and no farther communication with Jeruſalem took place, they were obliged to uſe tranſlations of the ſcriptures, or thoſe copies which were in poſſeſſion of the ſhepherds, who, they ſay, were all Jews before the time of Solomon. On being aſked, however, where the Shepherds got their copy, and being told, that, notwithſtanding the invaſion of Egypt by Nebuchadnezzer, there was ſtill a communication with Jeruſalem by means of the Iſhmaelite Arabs through Arabia, they frankly acknowledged that they could not tell; neither had they any memorials of the hiſtory either of their own or any other country; all that they believed in this caſe being derived from mere tradition, their hiſtories, if any exiſted, having been deſtroyed by the famous Mooriſh Captain Gragné, of whom an account is given under the article ETHIOPIA. They ſay, that the firſt book of Scripture they ever received was that of Enoch; and they place that of Job immediately after it, ſuppoſing that patriarch to have lived ſoon after the flood. They have no copy of the Old Teſtament in the Falaſha language, what they make uſe of being in that of Geez. This is ſold to them by the Abyſſinian Chriſtians, who are the only ſcribes in that country. No difference takes place about corruptions of the text; nor do the Falaſha know any thing of the Jewiſh Talmud, Targum, or Cabala.

FALCADE, in the manege, the motion of a horſe when he throws himſelf upon his haunches two or three times, as in very quick curvets; which is done in forming a ſtop and half ſtop. See STOP.

FALCATED, ſomething in the form of a ſickle: thus, the moon is ſaid to be *falcated* when ſhe appears horned.

FALCO, in ornithology, a genus belonging to the order of accipitres, the characters of which are theſe: The beak is crooked, and furniſhed with wax at the baſe: the head is thick-ſet with feathers, and the tongue is cloven. The eagle and hawk form this genus.

Plate cxc. 1. The leucocephalus, bald, or white-headed eagle of Cateſby, is aſh-coloured, with the head and tail white; the iris of the eye is white, over which is a prominence covered with a yellow ſkin; the bill and the cere or wax are yellow, as are likewiſe the legs and feet; and the talons are black. Though it is an eagle of ſmall ſize, it weighs nine pounds, is ſtrong and full of ſpirit, preying on lambs, pigs, and fawns. They always make their neſts near the ſea or great rivers, and uſually upon old dead pine or cypreſs trees, continuing to build annually on the ſame tree till it falls. Though he is ſo formidable to all birds, yet he ſuffers them to build near his royal neſt without moleſtation; particularly the fiſhing hawk, herons, &c. which all build on high trees, and in ſome places are ſo near one another, that they appear like a rookery. The neſts are very large and very fetid by reaſon of the relicts of their prey. Lawſon ſays they breed very often, laying again under their callow young; whoſe warmth hatches the eggs. In Bering's Iſle they make their neſts on the cliffs near ſix feet wide and one thick; and lay two eggs in the beginning of July. This ſpecies inhabits both Europe and America; but is more common in the latter. Beſides fleſh, it feeds alſo on fiſh. This, however, it does not procure for itſelf; but ſitting in a convenient ſpot, watches the dividing of the oſprey into the water after a fiſh, which the moment it has ſeized the bald eagle follows cloſe after, when the oſprey is glad to eſcape by dropping the fiſh from his bill; and ſuch is the dexterity of the former, that it often ſeizes the prey before it can fall to the ground. Cateſby ſays the male and female are much alike.

2. The oſſifragus, or ſea-eagle, with yellow wax, and half-feathered legs: it is about the ſize of a peacock; the feathers are white at the baſe, iron-coloured in the middle, and black at the points; and the legs are yellow. It is found in ſeveral parts of Great Britain and Ireland. Mr Willoughby tells us, that there was an aëry of them in Whinfield Park, Weſtmoreland; and the bird ſoaring in the air with a cat in its talons (which Barlow drew from the very fact which he ſaw in Scotland), is of this kind. The cat's reſiſtance brought both animals to the ground, when Barlow took them up; and afterwards cauſed the event to be engraved in the 36th plate of his Collection of Prints. Turner ſays, that in his days this bird was too well known in England; for it made horrible deſtruction among the fiſh. All authors indeed agree, that it feeds principally on fiſh, which it takes as they are ſwimming near the ſurface, by darting itſelf down upon them; not by diving or ſwimming, as ſome authors have pretended, who furniſh it for that purpoſe with a one webbed foot to ſwim with, and another divided foot to take its prey with. Martin, ſpeaking of what he calls the great eagles of the Weſtern Iſles, ſays, that they faſten their talons in the back of the fiſh, commonly of ſalmon, which are often above the water, or very near the ſurface. Thoſe of Greenland will even take a young ſeal out of the water. Turner, abovementioned, ſays, that the fiſhermen were fond of anointing their baits with the fat of this bird, imagining that it had a peculiar alluring quality: they were even ſuperſtitious enough to believe, that whenever the ſea-eagle hovered over a piece of water, the fiſh (as if charmed) would riſe to the ſurface with their bellies upwards; and in that manner preſent themſelves to him. It alſo preys on water fowl. This ſpecies is alſo frequent in North America, and was alſo met with in Botany Iſland by Captain Cooke.

3. The chryſaëtos, or golden eagle, weighs about 12 pounds, and is in length about three feet, the wings when extended meaſuring about ſeven feet four inches. The ſight and ſenſe of ſmelling are very acute: the head and neck are clothed with narrow, ſharp-pointed feathers, of a deep brown colour bordered with tawney; the hind part of the head in particular is of a bright ruſt colour. Theſe birds are very deſtructive to fawns, lambs, kids, and all kinds of game; particularly in the breeding ſeaſon, when they bring a vaſt quan-

tity of prey to their young. Smith, in his Hiſtory of Kerry, relates, that a poor man in that country got a comfortable ſubſiſtence for his family, during a ſummer of famine, out of an eagle's neſt, by robbing the eaglets of the food the old ones brought; whoſe attendance he protracted beyond the natural time, by clipping the wings and retarding the flight of the former. It is very unſafe to leave infants in places where eagles frequent; there being inſtances in Scotland of two being carried off by them; but, fortunately, the theft was diſcovered in time, and the children were reſtored unhurt out of the eagles neſts. In order to extirpate theſe pernicious birds, there is a law in the Orkney iſles, which entitles every perſon that kills an eagle to a hen out of every houſe in the pariſh where it was killed. Eagles ſeem to give the preference to the carcaſes of dogs and cats. People who make it their buſineſs to kill thoſe birds, lay one or other of theſe carcaſes by way of bait; and then conceal themſelves within gunſhot. They fire the inſtant the eagle alights: for ſhe, that moment, looks about before ſhe begins to prey. Yet, quick as her ſight may be, her ſenſe of hearing ſeems ſtill more exquiſite. If hooded crows or ravens happen to be nearer the carrion, and reſort to it firſt, and give a ſingle croak, the eagle is certain of inſtantly repairing to the ſpot.

Eagles are remarkable for their longevity, and for their power of ſuſtaining a long abſtinence from food. Mr Keyſler relates, that an eagle died at Vienna after a confinement of 104 years. This pre-eminent length of days probably gave occaſion to the ſaying of the Pſalmiſt, "Thy youth is renewed like the eagle's." One of this ſpecies, which was nine years in the poſſeſſion of Owen Holland, Eſq; of Conway, lived 32 years with the gentleman who made him a preſent of it; but what its age was when the latter received it from Ireland is unknown. The ſame bird alſo furniſhes us with a proof of the truth of the other remark; having once, through the neglect of ſervants, endured hunger for 21 days without any ſuſtenance whatever.

4. The fulvus, or white-tailed eagle of Edwards, has the whole plumage of a duſky brown: the breaſt marked with triangular ſpots of white, but which are wanting in the Britiſh kind: the tail is white, tipt with black; but in young birds duſky, blotched with white: the legs are covered to the toes with ſoft ruſt-coloured feathers. Theſe birds inhabit Hudſon's Bay and northern Europe as far as Drontheim. They are found on the higheſt rocks of the Uralian chain, where it is not covered with wood; but are moſt frequent on the Siberian, where they make their neſt on the loftieſt rocks. They are rather inferior in ſize to the ſea-eagle; but are generous, ſpirited, and docile. The independent Tartars train them for the chaſe of hares, foxes, antelopes, and even wolves. The uſe is of conſiderable antiquity; for Marco Polo, the great traveller of 1269, obſerved and admired the diverſion of the great cham of Tartary; who had ſeveral eagles, which were applied to the ſame purpoſes as they are at preſent. The Tartars alſo eſteem the feathers of the tail as the beſt they have for pluming their arrows. This ſpecies is frequent in Scotland; where it is called the *black eagle*, from the dark colour of its plumage. It is very deſtructive to deer, which it will ſeize between the horns; and by inceſſantly beating it about the eyes with its wings, ſoon makes a prey of the haraſſed animal. The eagles in the iſle of Rum have nearly extirpated the ſtags that uſed to abound there. They generally build in clefts of rocks near the deer-foreſts; and make great havoc not only among them, but alſo among the white hares and ptarmigans. Mr Willoughby gives the following curious account of the neſt of this ſpecies. "In the year of our Lord 1668, in the woodlands near the river Darwent, in the peak of Derbyſhire, was found an eagle's neſt made of great ſticks, reſting one end on the edge of a rock, the other on two birch trees; upon which was a layer of ruſhes, and over them a layer of heath, and upon the heath ruſhes again; upon which lay one young one and an addle egg; and by them a lamb, a hare, and three heath poults. The neſt was about two yards ſquare, and had no hollow in it. The young eagle was black as a hobby, of the ſhape of a goſhawk, almoſt of the weight of a gooſe, rough-footed, or feathered down to the foot: having a white ring about the tail."

5. The cyaneus, or hen-harrier, with white wax, yellow legs, a whitiſh blue body, and a white ring round the eyes and throat. It is the blue hawk of Edwards, and is a native of Europe and Africa. Theſe birds are extremely deſtructive to young poultry and to the feathered game: they fly near the ground, ſkimming the ſurface in ſearch of prey. They breed on the ground, and never are obſerved to ſettle on trees.

6. The albiulla, or cinereous eagle, is inferior in ſize to the golden eagle; the head and neck are of a pale aſh-colour; the body and wings cinereous, clouded with brown; the quill feathers very dark; the tail white; the legs feathered but little below the knees, and of a very bright yellow. The male is of a darker colour than the female. The bill of this ſpecies is rather ſtraighter than is uſual in the eagle; which ſeems to have induced Linnæus to place it among the *vultures*. But Mr Pennant obſerves, that it can have no title to be ranked with that genus, the characteriſtical mark of which is, that the head and neck are either quite bare, or only covered with down; whereas this bird is wholly feathered. This ſpecies is in ſize equal to the black eagle, and inhabits Europe as high as Iceland and Lapmark. It is common in Greenland, but does not extend to America; or, according to Mr Pennant, if it does, it varies into the white-headed eagle, to which it has great affinity, particularly in its feeding much on fiſh; the Danes therefore call it *Fiſke-orn*. It is common in the ſouth of Ruſſia, and about the Volga, as far as trees will grow; but is very ſcarce in Siberia. It inhabits Greenland the whole year, ſitting on the rocks with flagging wing, and flies ſlowly. It makes its neſt on the lofty cliffs, with twigs, lining the middle with moſſes and feathers; lays two eggs; and ſits in the latter end of May or beginning of June. Theſe birds prey on young ſeals, which they ſeize as they are floating on the water; but ofttimes, by fixing their talons in an old one, they are overmatched, and drawn down to the bottom, ſcreaming horribly. They feed alſo on fiſh, eſpecially the lumpfiſh, and a ſort of trout; on ptarmigans, auks, and eider ducks. They ſit on ~~the top~~ of rocks, attentive to the motion of the diving birds; and with quick eyes obſerve their courſe by the bubbles which riſe to the ſurface of the water, and catch the fowls as they riſe

for breath. The Greeenlanders uſe their ſkins for cloathing next to their bodies; eat the fleſh; and keep the bill and feet for amulets. They kill them with the bow or take them in nets placed in the ſnow properly baited; or tempt them by the fat of ſeals, which the eagles eat to an exceſs; which occaſions ſuch a torpidity as to make them an eaſy prey. They are common in Scotland and the Orkneys; where they feed on fiſh as well as on land animals.

7. The crying eagle (Arct. Zool. p. 215.), with a duſky bill and yellow cere; the colour of the plumage is a ferruginous brown; the coverts of the wings and ſcapulars are elegantly varied with oval white ſpots; the primaries duſky, the ends of the greater white; the breaſt and belly are of a deeper colour than the reſt of the plumage, ſtreaked downwards with dull yellow; the tail is dark brown, tipt with dirty white; the legs are feathered to the feet, which are yellow. The length of the bird is two feet.—This ſpecies is found in many parts of Europe, but not in Scandinavia; is frequent in Ruſſia and Siberia; and extends even to Kamtſchatka. It is leſs generous and ſpirited than other eagles, and is perpetually making a plaintive noiſe; from which it was ſtyled by the ancients *planga & clanga* *; and *anataria*, from its preying on ducks, which Pliny † deſcribes with great elegance. The Arabs uſed to train it for the chace; but its quarry was cranes and other birds; the more generous eagle being flown at antelopes and various quadrupeds. This ſpecies was itſelf an object of diverſion, and made the game of even ſo ſmall a falcon as the ſparrow hawk; which would purſue it with great eagerneſs, ſoar above, then fall on it, and faſtening with its talons, keep beating it about the head with its wings, till they both fell together to the ground. This Sir John Chardin has ſeen practiſed about Tauris.

8. The milvus, or kite, is a native of Europe, Aſia, and Africa. This ſpecies generally breeds in large foreſts or woody mountainous countries. Its neſt is compoſed of ſticks, lined with ſeveral old materials, ſuch as rags, bits of flannel, rope, and paper. It lays two, or at moſt three, eggs; which, like thoſe of other birds of prey, are much rounded and blunt at the ſmaller end. They are white, ſpotted with dirty yellow. Its motion in the air diſtinguiſhes it from all other birds, being ſo ſmooth and even that it is ſcarce perceptible. Sometimes it will remain quite motionleſs for a conſiderable ſpace; at others glide through the ſky without the leaſt apparent action of its wings; from thence deriving the old name of *glead* or *glede*, from the Saxon *glida*. They inhabit the north of Europe, as high as Jarlſberg, in the very ſouth of Norway; but do not extend farther. They quit Sweden in flocks at the approach of winter, and return in ſpring. Some of them winter about Aſtrakan, in lat. 46. 30: but the far greater part are ſuppoſed to retire into Egypt, being ſeen in September paſſing by Conſtantinople in their way from the north; and again in April returning to Europe, to ſhun the great heats of the eaſt. They are obſerved in vaſt numbers about Cairo, where they are extremely tame, and feed even on dates, probably for want of other food. They alſo breed there; ſo that, contrary to the nature of other rapacious birds, they increaſe and multiply twice in the year; once in the mild winters of Egypt, and a ſecond time in the ſummers of the north. It makes its appearance in Greece in the ſpring; and in the early ages, ſays Ariſtophanes, "it governed that country; and men fell on their knees when they were firſt bleſſed with the ſight of it, becauſe it pronounced the flight of winter, and told them to begin to ſhear their vernal fleeces." In Britain they are found the whole year. Lord Bacon obſerves, that when kites fly high, it portend fair and dry weather.

9. The gentilis, or gentil Falcon, inhabits the north of Scotland, and was in high eſteem as a bold and ſpirited bird in the days of falconry. It makes its neſt in rocks: it is larger than the goſhawk; the head of a light ruſt colour, with oblong black ſpots; the whole under ſide from chin to tail white, tinged with yellow; the back of a brown colour; the tail barred with four or five bars of black, and as many of aſh-colour; the very tips of all the tail-feathers white.

10. The ſubbuteo, or hobby, was uſed like the keſtrel in the humbler kind of falconry; particularly in what was called *daring of larks:* the hawk was caſt off; the larks, aware of their moſt inveterate enemy, were fixed to the ground for fear; by which means they became a ready prey to the fowler, by drawing a net over them. The back of this bird is brown; the nape of the neck white; and the belly pale, with oblong brown ſpots. It is a bird of paſſage; but breeds in Britain, and migrates in October.

11. The buteo, or buzzard, is the moſt common of the hawk kind in England. It breeds in large woods; and uſually builds on an old crow's neſt, which it enlarges, and lines with wool and other ſoft materials. It lays two or three eggs, which are ſometimes perfectly white, ſonetimes ſpotted with yellow. The cock buzzard will hatch and bring up the young if the hen is killed. The young keep company with the old ones for ſome little time after they quit the neſt; which is not uſual with other birds of prey, who always drive away their brood as ſoon as they can fly. This ſpecies is very ſluggiſh and inactive, and is much leſs in motion than other hawks; remaining perched on the ſame bough for the greateſt part of the day, and is found at moſt times near the ſame place. It feeds on birds, rabbits, moles, and mice; it will alſo eat frogs, earthworms, and inſects. This bird is ſubject to ſome variety in its colour. Some have their breaſt and belly of a brown colour, and are only marked croſs the craw with a large white creſcent; but uſually the breaſt is of a yellowiſh white, ſpotted with oblong ruſt-coloured ſpots, pointing downwards: the back of the head, neck, and coverts of the wings, are of a deep brown, edged with a pale ruſt-colour: the middle of the back covered only with a thick white down. The tail is barred with black, and aſh-colour, and ſometimes with ferruginous.

12. The tinnunculus, or keſtrel, breeds in the hollows of trees, in the holes of high rocks, towers, and ruined buildings. It feeds on field-mice, ſmall birds, and inſects; which it will diſcover at a great diſtance. This is the hawk that is ſo frequently ſeen in the air fixed in one place; and, as it were, fanning it with its wings; at which time it is watching for its prey. When falconry was in uſe in Great Britain, this bird was trained for catching ſmall birds and young partridges. It is eaſily diſtinguiſhed from all other hawks

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* *Ariſt. Hiſt. an. lib.* 9.

† *Lib.* 10. *c.* 3.

by its colours. The crown of the head and the greater part of the tail are of a fine light grey; the back and coverts of the wing of a brick-red, elegantly ſpotted with black: the whole under ſide of the bird of a pale ruſt-colour ſpotted with black.

13. The ſufflator, with yellowiſh wax and legs; the body is of a browniſh white colour; and the covers of the eyes are bony. He has a fleſhy lobe between the noſtrils; which when angry or terrified, he inflates till his head becomes as big as his whole body. He is a native of Surinam.

14. The cachinnans, or laughing hawk, has yellowiſh legs and wax, and white eye-brows; the body is variegated with brown and white; and it has a black ring round the top of the head. It makes a laughing kind of noiſe when it obſerves any perſon, and is a native of America.

15. The columbarius, or pigeon-hawk of Cateſby, weighs about ſix ounces. The bill is black at the point, and whitiſh at the baſe; the iris of the eye is yellow; the baſe of the upper mandible is covered with a yellow cere or wax; all the upper part of the body, wings, and tail, are brown. The interior vanes of the quill-feathers have large red ſpots. The tail is marked with large regular tranſverſe white lines; the throat, breaſt, and belly, are white, mixed with brown; the ſmall feathers that cover the thighs reach within half an inch of the feet, and are white, with a tincture of red, beſet with long ſpots of brown; the legs and feet are yellow. It inhabits America, from Hudſon's Bay as low as South-Carolina. In the laſt it attains to a larger ſize. In Hudſon's Bay it appears in May on the banks of Severn river, breeds and retires ſouth in autumn. It feeds on ſmall birds; and on the approach of any perſon, flies in circles, and makes a great ſhrieking. It forms its neſt in a rock, or ſome hollow tree, with ſticks and graſs; and lines it with feathers: and lays from two to four eggs, white, ſpotted with red. In Carolina it preys on pigeons, and young of the wild turkies.

16. The furcatus, or ſwallow-tailed hawk, has a black bill, leſs hooked than uſual with rapacious birds: the eyes are large and black, with a red iris: the head, neck, breaſt, and belly, are white; the upper part of the back and wings a dark purple; but more duſky towards the lower parts, with a tincture of green. The wings are long in proportion to the body, and, when extended, meaſure four feet. The tail is dark purple mixed with green, and remarkably forked. This moſt elegant ſpecies inhabits only the ſouthern parts of North-America; and that only during ſummer. Like ſwallows, they feed chiefly flying; for they are much on wing, and prey on various ſorts of inſects. They alſo feed on lizards and ſerpents; and will kill the largeſt of the regions it frequents with the utmoſt eaſe. They quit North-America before winter, and are ſuppoſed to retreat to Peru.

17. Haliætus, the fiſhing-hawk of Cateſby, or the oſprey, weighs three pounds and a quarter; it meaſures, from one end of the wing to the other, five feet and a half. The bill is black, with a blue cere or wax; the iris of the eye is yellow, and the crown of the head brown, with a mixture of white feathers; from each eye, backwards, runs a brown ſtripe: the back, wings, and tail, are of a dark brown; the throat, neck, and belly, white; the legs and feet are rough and ſcaly, and of a pale blue colour; the talons are black, and nearly of an equal ſize; the feathers of the thighs are ſhort, and adhere cloſe to them, contrary to others of the hawk kind, which nature ſeems to have deſigned for the more eaſily penetrating the water. Notwithſtanding the oſprey is ſo perſecuted by the bald eagle, yet it always keeps near its haunts. It is a ſpecies of vaſt quickneſs of ſight; and will ſee a fiſh near the ſurface from a great diſtance: deſcend with prodigious rapidity, and carry the prey with an exulting ſcream high into the air. The eagle hears the note and inſtantly attacks the oſprey; who drops the fiſh, which the former catches before it can reach the ground or water. The lower parts of the rivers and creeks near the ſea in America, abound with theſe eagles and hawks, where ſuch diverting conteſts are often ſeen. It ſometimes happens that the oſprey periſhes in taking its prey; for if it chances to fix its talons in an over-grown fiſh, it is drawn under water before it can diſengage itſelf, and is drowned.

18. The Iceland falcon (G. Mag. 1771, p. 297), or gyrfalco *Lin.* has a ſtrong bill, much hooked, the upper mandible ſharply angulated on the lower edges, with a bluiſh wax: the head is of a very pale ruſt-colour, ſtreaked downwards with duſky lines: the neck, breaſt, and belly, are white, marked with cordated ſpots; the thighs white, croſſed with ſhort bars of deep brown: the back and coverts of the wings are duſky, ſpotted and edged with white; the exterior webs of the primaries duſky mottled with reddiſh white, the inner barred with white: the feathers of the tail are croſſed with 14 or more narrow bars of duſky and white; the duſky bars regularly oppoſing thoſe of white: the wings, when cloſed, reach almoſt to the end of the train: legs are ſtrong and yellow. The length of the wing, from the pinion to the tip is 16 inches. This ſpecies is an inhabitant of Iceland, and is the moſt eſteemed of any for the ſport of falconry.

19. The fuſcus, or Greenland falcon, has duſky irides; lead-coloured wax and feet; brown crown, marked with irregular oblong white ſpots; whitiſh forehead, blackiſh cheeks; the hind part of the head and throat white; breaſt and belly of a yellowiſh white, ſtriped downwards with duſky ſtreaks; the back duſky, tinged with blue, the ends of the feathers lighteſt, and ſprinkled over with a few white ſpots, eſpecially towards the rump; the wings of the ſame colours, variegated beneath with white and black; the upper part of the tail duſky croſſed very faintly with paler bars, the under ſide whitiſh. It inhabits all parts of Greenland, from the remoteſt hills to thoſe which impend over the ſea. They are even ſeen on the iſlands of ice remote from ſhore. They retire in the breeding-ſeaſon to the fartheſt part of the country, and return in autumn with their young. They breed in the ſame manner as the cinereous eagle, but in more diſtant places; and lay from three to five eggs. The tail of the young is black, with great brown ſpots on the exterior webs. They prey on ptarmigans, auks, and all the ſmall birds of the country. They have frequent diſputes with the raven, but ſeldom come off victors;

for the raven will, on being attacked, fling itſelf on its back; and either by defending itſelf with its claws, or by calling, with its croaking, numbers of others to its help, oblige the falcon to retire. The Greenlanders uſe the ſkin, among others, for their inner garments; the wings for bruſhes; the feet for amulets: but ſeldom eat the fleſh, unleſs compelled by hunger.

20. The gyrfalcon (Br. Zool. nº 47.) has a yellow wax; the bill bluiſh, and greatly hooked: the eye dark blue; the throat of a pure white; the whole body, wings, and tail, of the ſame colour, moſt elegantly marked with duſky bars, lines, or ſpots, leaving the white the far prevailing colour. There are inſtances, but rare, of its being found entirely white. In ſome, the whole tail is croſſed by remote bars of black or brown; in others, they appear only very faintly on the middle feathers: the feathers of the thighs are very long and unſpotted: the legs ſtrong, and of a light blue. Its weight is 45 ounces Troy; length, near two feet; extent, four feet two. This ſpecies has the ſame manners and haunts with the former. It is very frequent in Iceland; is found in Lapmark and Norway; and rarely in the Orknies and North Britain. In Aſia, it dwells in the higheſt points of the Urallian and other Siberian mountains, and dares the coldeſt climates throughout the year. It is kept in the latitude of Peterſburg, uninjured in the open air during the ſevereſt winters.—This ſpecies is pre-eminent in courage as well as beauty, and is the terror of other hawks. It was flown at all kinds of fowl, how great ſoever they were; but its chief game uſed to be herons and cranes.

The three laſt ſpecies are in high eſteem for ſport. They are reſerved for the kings of Denmark; who ſend their falconer with two attendants annually into Iceland to purchaſe them. They are caught by the natives; a certain number of whom in every diſtrict are licenſed for that purpoſe. They bring all they take, about midſummer, to Beſſeſted, to meet the royal falconer; and each brings 10 or 12, capped, and perched on a croſs pole, which they carry on horſeback and reſt on the ſtirrup. The falconer examines the birds, rejects thoſe which are not for his purpoſe, and gives the ſeller a written certificate of the qualities of each, which intitles him to receive from the king's receiver general ſeventeen rixdollars for the pureſt white falcon (nº 20.), ten for nº 19. or thoſe which are leaſt white; and ſeven for nº 18. This brings into the iſland between 2000 and 3000 rixdollars annually. They are taken in the following manner:—Two poſts are faſtened in the ground, not remote from their haunts. To one is tied a ptarmigan, a pigeon, a cock or hen, faſtened to a cord that it may have means of fluttering, and ſo attract the attention of the falcon. On the other poſt is placed a net, diſtended on a hoop, about ſix feet in diameter. Through this poſt is introduced a ſtring, above 100 yards long, which is faſtened to the net, in order to pull it down; and another is faſtened to the upper part of the hoop, and goes through the poſt to which the bait is tied. As ſoon as the falcon ſees the fowl flutter on the ground, he takes a few circles in the air, to ſee if there is any danger, then darts on its prey with ſuch violence as to ſtrike off the head, as nicely as if it was done with a razor. He then uſually riſes again, and takes another circle, to explore the place a ſecond time: after which it makes another ſtoop; when, at the inſtant of its deſcending, the man pulls the dead bird under the net; and, by means of the other cord, covers the falcon with the net at the moment it has ſeized the prey; the perſon lying concealed behind ſome ſtones, or elſe lies flat on his belly, to elude the ſight of the falcon. As ſoon as one is caught, it is taken gently out of the net, for fear of breaking any of the feathers of the wings or tail; and a cap is placed over its eyes. If any of the tail-feathers are injured, the falconers have the art of grafting others; which ſometimes has occaſioned a needleſs multiplication of ſpecies.

The Iceland falcons are in the higheſt eſteem. They will laſt 10 or 12 years; whereas thoſe of Norway, and other countries, ſeldom are fit for ſport after two or three years uſe. Yet the Norwegian hawks were in old times in great repute in Britain, and even thought bribes worthy of a king. Geoffroy Le Pierre, chief juſticiary, gave two good Norway hawks to King John, that Walter Le Madina might have leave to export 100 weight of cheeſe. John the ſon of Ordgar, gave a Norway hawk to have the king's requeſt to the king of Norway, to let him have his brother's chattels; and Ralf Havoc fined to King Stephen in two girfals (gyrfalcons) and two Norway hawks, that he might have the ſame acquittance that his father had.

21. The aviporus, with black wax, yellow legs, half naked, the head of an aſh colour, and having an aſh-coloured ſtripe on the tail, which is white at the end. It is the honey-buzzard of Ray, and had its name from the combs of waſps being found in its neſt. It is a native of Europe, and feeds on mice, lizards, frogs, bees, &c. It runs very ſwiftly, like a hen.

22. The æruginoſus, or moor-buzzard, with greeniſh wax, a greyiſh body, the top of the head, nape of the neck, and legs, yellowiſh; is a native of Europe, and frequents moors, marſhy places, and heaths: it never ſoars like other hawks; but commonly ſits on the ground or on ſmall buſhes. It makes its neſt in the midſt of a tuft of graſs or ruſhes. It is a very fierce and voracious bird; and is a great deſtroyer of rabbits, young wild-ducks, and other water-fowl. It preys, like the oſprey, on fiſh.

23. The palumbarius with black wax edged with yellow; yellow legs, a brown body, the prime feathers of the tail marked with pale ſtreaks, and the eye-brows white. It is the goſhawk of Ray; and was formerly in high eſteem among falconers, being flown at cranes, geeſe, pheaſants, and partridges. It breeds in Scotland, and builds its neſt in trees. It is very deſtructive to game, and daſhes through the woods after its quarry with vaſt impetuoſity; but if it cannot catch the object of its purſuit almoſt immediately, deſiſts, and perches on a bough till ſome new game preſents itſelf. This ſpecies is common in Muſcovy and Siberia. They extend to the river Amur; and are uſed by the emperor of China in his ſporting progreſſes, attended by his grand falconer, and 1000 of the ſubordinate. Every bird has a ſilver plate faſtened to its foot, with the name of the falconer who had the charge of it; that in caſe it ſhould be loſt, it might be brought to the proper perſon; but if he could not be found, the bird is delivered to another officer, called the *guardian of loſt birds*; who keeps it till it is de-

manded by the falconer to whom it belonged. That this great officer may the more readily be found among the army of hunters who attend the emperor, he erects a ſtandard in the moſt conſpicuous place.

24. The niſus, or ſparrow-hawk, with green wax, yellow legs, a white belly undulated with grey, and the tail marked with blackiſh belts. This is the moſt pernicious hawk we have; and makes great havoc among pigeons as well as patridges. It builds in hollow trees, in old neſts of crows, large ruins, and high rocks: it lays four white eggs, encircled near the blunter end with red ſpecks.

25. The minutus, with white wax, yellow legs, and the body white underneath. It is the leaſt hawk of Briſſons, being about the ſize of a thruſh; and is found on the iſland Melita.

There are near 100 other ſpecies diſtinguiſhed by ornithologiſts. Among theſe are two deſcribed by Mr Bruce; one of which deſerves particular notice here, as being not only the largeſt of the eagle kind, but, in our author's opinion, the largeſt bird that flies. He calls it the *golden eagle;* by the natives it is vulgarly called *abou duchn*, or *father long-beard*. It is not an object of any chace, nor ſtood in need of any ſtratagem to bring it within reach. Upon the higheſt top of the mountain Lamalmon, while Mr Bruce's ſervants were refreſhing themſelves from that toilſome rugged aſcent, and enjoying the pleaſure of a moſt delightful climate, eating their dinner in the outer air with ſeveral large diſhes of boiled goats fleſh before them, this eagle ſuddenly made its appearance; he did not ſtoop rapidly from a height, but came flying ſlowly along the ground; and ſat down cloſe to the meat within the ring the men had made round it. A great ſhout, or rather cry of diſtreſs, which they raiſed, made the bird ſtand for a minute as if to recollect himſelf, while the ſervants ran for their lances and ſhields. His attention was fully fixed upon the fleſh. He put his foot into the pan where was a large piece in water prepared for boiling; but finding the ſmart which he had not expected, he withdrew it, and forſook the piece which he held. There were two large pieces, a leg and a ſhoulder, lying upon a wooden platter; into theſe he truſſed both his claws and carried them off; ſkipping ſlowly along the ground as he had come, till he diſappeared behind a cliff. But being obſerved at his departure to look wiſtfully at the large piece which remained in the warm water, it was concluded that he would ſoon return: in expectation of which Mr Bruce loaded a rifle-gun with ball, and ſat down cloſe to the platter by the meat. It was not many minutes before he came, and a prodigious ſhout was raiſed by the attendants, "He is coming, he is coming!" enough to have diſcouraged a leſs courageous animal. Whether it was not quite ſo hungry as at the firſt viſit, or ſuſpected ſomething from Mr Bruce's appearance, it made a ſmall turn, and ſat down about ten yards from him, the pan with the meat being between them. In this ſituation Mr Bruce fired, and ſhot him with the ball through the middle of his body about two inches below the wing, ſo that he lay down upon the graſs without a ſingle flutter. Upon laying hold of his monſtrous carcaſe, our author was not a little ſurpriſed at ſeeing his hands covered and tinged with yellow powder or duſt. Upon turning him upon his belly, and examining the feathers of his back, they produced a brown duſt, the colour of the feathers there. This duſt was not in ſmall quantities; for upon ſtriking his breaſt, the yellow powder flew in fully greater quantity than from a hair-dreſſer's powder puff. The feathers of the belly and breaſt, which are of a gold colour, did not appear to have any thing extraordinary in their formation, but the large feathers in the ſhoulder and wings ſeemed apparently to be fine tubes, which upon preſſure ſcattered this duſt upon the finer part of the feather, but this was brown, the colour of the feathers of the back. Upon the ſide of the wing, the ribs, or hard part of the feather, ſeemed to be bare as if worn, or, in our author's opinion, were rather renewing themſelves, having before failed in their function. What is the reaſon of this extraordinary proviſion of nature, our author does not pretend to determine. But as it is an unuſual one, it is probably meant, he thinks, for a defence againſt the climate in favour of thoſe birds which live in thoſe almoſt inacceſſible heights of a country doomed even in its lower parts to ſeveral months of exceſſive rain. According to Mr Bruce's deſcription, this bird, from wing to wing, was 8 feet 4 inches; from the tip of his tail to the point of his beak when dead, 4 feet 7 inches. He was remarkably ſhort in the legs, being only four inches from the joining of the foot to where the leg joins the thigh, and from the joint of the thigh to the joining of his body ſix inches. The thickneſs of his thigh was little leſs than four inches; it was extremely muſcular, and covered with fleſh. His middle claw was about two inches and a half long, not very ſharp at the point, but extremely ſtrong. From the root of the bill to the point was three inches and a quarter, and one inch and three quarters in breadth at the root. A forked bruſh of ſtrong hair, divided at the point into two, proceeded from the cavity of his lower jaw at the beginning of his throat. His eye was remarkably ſmall in proportion to his bulk, the aperture being ſcarcely half an inch. The crown of his head was bare or bald, as was alſo the front where the bill and ſkull joined.

FALCON, or **FAUCON**, a bird of prey of the hawk kind, ſuperior to all others for courage, docility, gentleneſs, and nobleneſs of nature*. Several authors take the name *falcon* to have been occaſioned by its crooked talons or pounces, which reſemble a falx or ſickle. Giraldus derives it *a falcando*, becauſe it flies in a curve.

The falcon, or falcon gentle, is both for the fiſt and for the lure. In the choice, take one that has wide noſtrils, high and large eye-lids, a large black eye; a round head, ſomewhat full on the top; barb feathers on the clap of the beaks, which ſhould be ſhort, thick, and of an azure colour; the breaſt large, round, and fleſhy; and the thighs, legs, and feet, large and ſtrong; with the ſear of the foot ſoft and bluiſh: the pounces ſhould be black, with wings long and croſſing the train which ſhould be ſhort and very pliable.

The name *falcon* is reſtrained to the female; for the male is much ſmaller, weaker, and leſs courageous, than the female; and therefore is denominated *taſſel*, or *tircelet*. The falcon is excellent at the river, brook, and even field; and flies chiefly at a larger game, as wild-gooſe, kite, crow, heron, crane, pye, ſhoveler, &c. For further particulars, ſee FALCONRY, HAWK, and HAWKING.

The cuſtom of carrying a falcon extended to many coun-

* See *Falco*.

countries, and was eſteemed a diſtinction of a man of rank. The Welſh had a ſaying, that you may know a gentleman by his hawk, horſe, and grehound. In fact, a perſon of rank ſeldom went without one on his hand. Harold, afterwards king of England, is painted going on a moſt important embaſſy, with a hawk on his hand and a dog under his arm. Henry VI. is repreſented at his nuptials, attended by a nobleman and his falcon. Even the ladies were not without them in earlier times; for in an ancient ſculpture in the church of Milton Abbas, in Dorſetſhire, appears the conſort of king Athelſtan with a falcon on her royal fiſt tearing a bird.

FALCONER, a perſon who brings up, tames, and makes, that is, tutors and manages, birds of prey; as falcons, hawks, &c. See FALCONRY.

The grand ſeignior uſually keeps 6000 falconers in his ſervice.—The French king has a grand falconer, which is an office diſmembered from that of great hunt, *grand venur*. Hiſtorians take notice of this poſt as early as the year 1250.

A falconer ſhould be well acquainted with the quality and mettle of his hawks, that he may know which of them to fly early and which late. Every night after flying he ſhould give them caſting; one while plumage, ſometimes pellets of cotton, and at another time phyſic, as he finds neceſſary. He ought alſo every evening to make the place clean under the porch, that by her caſting he may know whether ſhe wants ſcouring upwards or downwards. Nor muſt he forget to water his hawk every evening, except on ſuch days as ſhe has bathed; after which, at night, ſhe ſhould be put into a warm room, having a candle burning by her, where ſhe is to ſit unhooded, if ſhe be not ramage, that ſhe may pick and prune herſelf.—A falconer ſhould always carry proper medicines into the field, as hawks frequently meet with accidents there. Neither muſt he forget to take with him any of his hawking implements; and it is neceſſary he ſhould be ſkilful in making lures, hoods of all ſorts, jeſſes, bewets, and other furniture. Neither ought he to be without his coping irons, to cope his hawk's beak when overgrown, and to cut her pounces and talons as there ſhall be occaſion: nor ſhould his cauterizing irons be wanting.

FALCONER (William), an ingenious Scots ſailor, who, about the year 1762, came up to London with a pretty pathetic poem, called the *Shipwreck*, founded on a diſaſter of his own experience. The publication of this piece recommended him to the late duke of York; and he would in all probability have been ſuitably preferred, if a ſecond ſhipwreck, as may be ſuppoſed, had not proved fatal to him, and to many gentlemen of rank and fortune with whom he ſailed. In 1770, he went out a volunteer in the Aurora frigate ſent to carry Meſſrs Vanſittart, Scrafton, and Ford, the ſupervisors appointed to regulate the Engliſh Eaſt India ſettlements; which veſſel, after it had touched at the Cape of Good Hope, was never more heard of. Before his departure, he publiſhed a very uſeful *Marine Dictionary*, in 1 vol. 4to.

FALCONRY, the art of training all manner of hawks, but more eſpecially the larger ones called *falcons*, to the exerciſe of hawking. See HAWKING.

When a falcon is taken, ſhe muſt be ſeeled in ſuch a manner, that, as the ſeeling ſlackens, ſhe may ſee what proviſion lies before her; but care ought to be taken, not to ſeel her too hard. A falcon or hawk newly taken ſhould have all new furniture, as new jeſſes of good leather, mailled leaſhes with buttons at the end, and new bewets. There ſhould alſo be provided a ſmall round ſtick, to ſtroke the hawk; becauſe, the oftener this is done, the ſooner and better will ſhe be manned. She muſt alſo have two good bells, that ſhe may be found when ſhe ſcattereth. Her hood ſhould be well faſhioned, raiſed, and emboſſed againſt her eyes, deep, and yet ſtraight enough beneath, that it may faſten about her head without hurting her; and her beak and talons muſt be a little coped, but not ſo near as to make them bleed.

If it be a ſoar-falcon which hath already paſſed the ſeas, ſhe will indeed be harder to reclaim, but will prove the beſt of falcons. Her food muſt be good and warm, and given her twice or thrice a-day, till ſhe be full gorged: the beſt for this purpoſe is pigeons, larks, or other live birds; becauſe ſhe muſt be broken off by degrees from her accuſtomed feeding. When ſhe is fed, you muſt hoop and lure, as you do when you call a hawk, that ſhe may know when you intend to give her meat. On this occaſion ſhe muſt be unhooded gently; and after giving her two or three bits, her hood muſt be put on again, when ſhe is to get two or three bits more. Care muſt be taken that ſhe be cloſe ſeeled; and after three or four days, her diet may be leſſened: the falconer ſetting her every night to pearch by him, that he may awaken her often in the night. In this manner he muſt proceed, till he find her to grow tame and gentle; and when ſhe begins to feed eagerly, he may give her a ſheep's heart. He may now begin to unhood her in the day-time; but it muſt be far from company, firſt giving her a bit or two, then hooding her gently, and giving her as much more. When ſhe is ſharp ſet, he may now unhood her, and give her ſome meat juſt againſt his face and eyes, which will make her leſs afraid of the countenances of others. She muſt be borne continually on the fiſt, till ſhe is properly manned, cauſing her to feed in company, giving her in the morning, about ſun-riſe, the wing of a pullet; and in the evening, the foot of a hare or coney, cut off above the joint, flead and laid in water, which being ſqueezed, is to be given her with the pinion of a hen's wing. For two or three days give her waſhed meat, and then plumage in more or leſs quantity as ſhe is thought to be more or leſs foul within. After this, being hooded again, ſhe is to get nothing till ſhe has gleaned and caſt, when a little hot meat may be given her in company; and, towards evening, ſhe may be allowed to plume a hen's wing in company alſo. Cleanſe the feathers of her caſting, if foul and ſlimy; if ſhe be clean within, give her gentle caſtings; and when ſhe is reclaimed, manned, and made eager and ſharp ſet, he may venture te feed her on the lure.

However, three things are to be conſidered before the lure be ſhowed her, 1. That ſhe be bold and familiar in company, and not afraid of dogs and horſes. 2. Sharp ſet and hungry, having regard to the hour of morning and evening, when you would lure her. 3. Clean within, and the lure well garniſhed with meat on both ſides; and when you intend to give her the length of a leaſh, you muſt abſcond yourſelf.

She muſt alſo be unhooded, and have a bit or two given her on the lure as ſhe ſits on your fiſt; afterwards take the lure from her, and hide it, that ſhe may not ſee it, and when ſhe is unſeeled, caſt the lure ſo near her, that ſhe may catch it within the length of her leaſh, and as ſoon as ſhe has ſeized it, uſe your voice as falconers do, feeding her upon the lure, on the ground, with the heart and warm thigh of a pullet.

Having ſo lured your falcon, give her but little meat in the evening; and let this luring be ſo timely, that you may give her plumage, and a juck of a joint next morning on your firſt. When ſhe has caſt and gleamed, give her a little reaching of warm meat. About noon, tie a creance to her leaſh; and going into the field, there give her a bit or two upon her lure: then unwind the creance, and draw it after you a good way; and let him who has the bird hold his right hand on the taſſel of her hood, ready to unhood her as ſoon as you begin to lure; to which if ſhe come well, ſtoop roundly upon it, and haſtily ſeize it, let her caſt two or three bits thereon. Then, unſeizing and taking her off the lure, hood her and give her to the man again; and, going farther off, lure and feed her as before.

In this manner is the falconer to proceed, luring her every day farther and farther off, till ſhe is accuſtomed to come freely and eagerly to the lure; after which ſhe may be lured in company, taking care that nothing affright her. When ſhe is uſed to the lure on foot, ſhe is to be lured on horſeback; which may be effected the ſooner, by cauſing horſemen to be about her when ſhe is lured on foot.

When ſhe has grown familiar to this way, let ſomebody on foot hold the hawk, and he on horſeback muſt call and caſt the lure about his head, the holder taking off the hood by the taſſel; and if ſhe ſeize eagerly on the lure without fear of man or horſe, then take off the creance, and lure her at a greater diſtance. And if you would have her love dogs as well as the lure, call dogs when you give her her living or plumage. See the article HAWKING.

FALERII (anc. geog.), a town of Etruria, on the weſt or right ſide of the Tiber; Faliſci, the people of the town and territory. The territory was famous for its rich paſtures; hence the *gramen Faliſcum* in authors. Eutropius and Frontinus call the town *Faliſci;* which, according to the laſt, was ſurnamed *Colonia Junonia*. The Faliſci are called *Aequi* by Virgil; becauſe they afforded ſupplemental laws to the 12 tables, (Servius). Here they made an excellent ſauſage, called *Venter Faliſcus* (Martial).

When the Faliſci were beſieged by Camillus, a ſchoolmaſter went out of the gates of the city with his pupils, and propoſed to betray them into the hands of the Roman enemy, that by ſuch a poſſeſſion he might eaſily oblige the place to ſurrender. Camillus heard the propoſal with indignation, and ordered the man to be ſtripped naked, and whipped back to the town by thoſe whom his perfidy wiſhed to betray. This inſtance of generoſity operated upon the people ſo powerfully that they ſurrendered to the Romans.

FALERNUS, *Mons Maſſicus* ſo called (Martial); Falernus ager, a diſtrict at the foot of Mount Maſſicus in Campania; famous for its generous wines, (Horace, Pliny). Now called *Monte Maſſico*.

FALISCI. See FALERII.

FALKIA, in botany: a genus of the trigynia order, belonging to the hexandria claſs of plants. The calyx is monophyllous; the corolla monopetalous; the ſeeds four in number.

FALKIRK, a town of Stirlingſhire in Scotland, ſituated in W. Long. 3. 48. N. Lat. 56. 20. It is a large ill-built place, and is ſupported by great fairs for black cattle from the Highlands, it being computed that 24,000 head are annually ſold there. A great deal of money is alſo got here by the carriage of goods landed at Carron wharf to Glaſgow. This town is remarkable for a battle fought in its neighbourhood between Edward I. of England, and the Scots commanded by the Steward of Scotland, Cummin of Badenoch, and Sir William Wallace. The latter had been inveſted with the ſupreme command; but perceiving that this gave umbrage to the nobility, he reſigned his power into the hands of the nobleman abovementioned, reſerving to himſelf only the command of a ſmall body who refuſed to follow another leader. The Scots generals placed their pikemen along the front, and lined the intervals between the three bodies of which their army was compoſed, with archers; and dreading the great ſuperiority of the Engliſh cavalry, endeavoured to ſecure their front by palliſadoes tied together with ropes. The battle was fought on the 22d of July 1298. The king of England divided his army likewiſe into three bodies, and by the ſuperiority of his archers, defeated the Scots with great ſlaughter. Wallace alone preſerved entire the troops he commanded; and retiring behind the Carron, marched leiſurely along the banks of that river, which protected him from the enemy. In this battle fell John de Graham, a gentleman much celebrated for his valour, and ſtyled the *right hand* of the gallant Wallace. His epitaph is ſtill to be ſeeen on a plain ſtone in the church yard of Falkirk. On the 18th of January 1746, a battle was fought here between the king's forces commanded by general Hawley, and the Highlanders headed by Charles Stuart. The former was ſeized with a panic, and fled; but Colonel Huſk with two regiments, who kept their ground, prevented the Highlanders from purſuing their victory. Extenſive ruins are perceived in the neighbourhood of this town, ſuppoſed by ſome antiquarians to have been the capital of the Pictiſh government; but others believe them to be the remains of ſome Roman ſtations.

FALKLAND, a ſmall town of Fifeſhire in Scotland, made a royal burgh by James II. in 1458. Here ſtood one of the ſeats of the Macduffs earls of Fife. On the attainder of Munro Stewart, the 17th earl, it became forfeited to the crown in 1424. James V. who grew very fond of the place, enlarged and improved it. The remains evince its former magnificence and elegance, and the fine taſte of the princely architect. The gateway is placed between two fine round towers; on the right-hand joins the chapel whoſe roof is of wood, handſomely gilt and painted, but in a moſt ruinous condition. Beneath are ſeveral apartments. The front next to the court was beautifully adorned with ſtatues, heads in baſs-relief, and elegant columns not reducible to any order, but of fine proportion, with capitals approaching the Ionic ſcroll. Beneath ſome of theſe pillars was inſcribed I. R. M. G. 1537: or *Jacobus Rex, Maria de Guiſe*.—This place was alſo a favourite reſidence of James VI. on account of the fine park and plenty of deer. The eaſt ſide was accidentally burnt in the time of Charles II. and the park ruined during Cromwell's uſurpation; when the fine oaks were cut down in order to build the fort at Perth. —This place gives title of viſcount to the Engliſh family of Carey; Sir Henry Carey being ſo created by James VI. 1620. His ſon was the celebrated Lucius, who ſacrificed his life in a fit of loyal deſpair at the battle of Newbury, and from whom Lucius Charles the preſent viſcount is the fifth in lineal deſcent.

FALKLAND (Lord). See CAREY.

FALL, the deſcent of a heavy body towards the centre of the earth. It is alſo the name of a meaſure of length uſed in Scotland, containing ſix ells.

FALL of Man, in ſacred hiſtory, that terrible event by which ſin and death were introduced into the world. See ADAM, and ANTEDILUVIANS, and *Original Sin*. The account which Moſes gives of this tranſaction is extremely brief and conciſe. The ſerpent, he informs us, being more ſubtile than any beaſt of the field, aſked the woman, whether it was true that God had not granted her and her huſband leave to eat of every tree in the garden? ſhe anſwered, that God had allowed them to eat of all, except only the fruit of the tree in the midſt of the garden; which he commanded they ſhould not taſte, nor ſo much as touch, leſt they ſhould die. The ſerpent replied, that they ſhould not die; for God knew the virtue of the tree; and that, ſo ſoon as they eat of it, their eyes would be opened, and they would become like gods, knowing good and evil. Eve, ſeeing the fruit tempting to the view, took of the fruit and ate; and gave alſo to her huſband of it, and he did eat. Immediately the eyes of both were opened; when perceiving they were naked, they ſewed fig-leaves together, and made themſelves aprons. Adam and Eve, hearing the voice of God walking in the garden in the cool of the day, hid themſelves among the trees; but, on God's calling for Adam, he excuſed himſelf for not appearing, becauſe he was naked. God demanded of him, who it was that told him he was naked; and whether he had diſobeyed his command, in eating the forbidden fruit? Adam confeſſed that the woman had offered him the fruit, and he had taſted it. She, being examined likewiſe, acknowledged what ſhe had done; but ſaid, the ſerpent had ſeduced and deceived her. God then proceeded to judgment; he firſt curſed the ſerpent above all beaſts, and condemned him to go on his belly, and eat the duſt; adding, that he would put enmity between him and the woman, and their offspring; that the ſeed of the woman ſhould bruiſe the ſerpent's head, who ſhould bruiſe the other's heel. The woman was ſubjected to the pains of childbirth, as well as to the dominion of her huſband; and as to the man, God curſed the ground for his ſake, declaring, that it ſhould bring forth thorns and thiſtles, and he ſhould earn his bread by the ſweat of his brow, till he returned to the duſt, from whence he was taken. At laſt, having clothed them both with ſkins, he turned them out of the garden, leſt they ſhould take of the tree of life, and eat, and live for ever: then, to prevent any attempt to return to their former habitation, he placed cherabims at the eaſt of the garden, and a flaming ſword, which turned every way, to guard the paſſage to the tree of life.

This conciſe account being, at firſt view, incumbered with ſome difficulties, ſeveral learned and pious men have been inclined to believe the whole ought to be taken in an allegorical ſenſe, and not according to the ſtrictneſs of the letter: they alledge, that the ancients, and particularly the eaſtern nations, had two different ways of delivering their divinity and philoſophy, one popular, and the other myſterious; that the ſcripture uſes both occaſionally; ſometimes accommodating itſelf to the capacities of the people, and at other times to the real but more veiled truth; and that, to obviate the many difficulties which occur in the literal hiſtory of this ſad cataſtrophe, the ſafeſt way is to underſtand it as a parabolical ſtory, under which the real circumſtances are diſguiſed and concealed, as a myſtery not fit to be more explicitly declared.

Though it cannot be denied that ſome of the ancient philoſophers affected ſuch an allegorical way of writing, to conceal their notions from the vulgar, and keep their learning within the bounds of their own ſchool; yet it is apparent Moſes had no ſuch deſign; and as he pretends only to relate matters of fact, juſt as they happened, without art or diſguiſe, it cannot be ſuppoſed but that this hiſtory of the fall is to be taken in a literal ſenſe, as well as the reſt of his writings. It is generally agreed, that the ſerpent which tempted Eve was the Devil, who envying the privileges of man in his innocence, tempted him, and was the cauſe of his forfeiting all thoſe advantages which he had received from God at his creation; and that to this end he aſſumed the form of a ſerpent. Theſe interpretations are ſupported by many paſſages of Scripture, where the Devil is called the *ſerpent*, and the *old ſerpent*, (See John viii. 44. 2 Cor. xi. 3. and Rev. xii. 9.) Some believe that the ſerpent had then the uſe of ſpeech, and converſed familiarly with the woman, without her conceiving any diſtruſt of him; and that God, to puniſh the malice with which he had abuſed Eve, deprived him of the uſe of ſpeech. Others maintain, that a real ſerpent having eaten of the forbidden fruit, Eve from thence concluded, that ſhe too might eat of it without danger; that in effect ſhe did eat of it, and incurred the diſpleaſure of God by her diſobedience. This, ſay theſe laſt authors, is the plain matter of fact which Moſes would relate under the allegorical repreſentation of the ſerpent converſing with Eve.

The opinion of ſuch as believe this was not a real ſerpent, but only the Devil under that name, is no leſs liable to exception than any of the reſt. For though the Devil is frequently ſtyled in Scripture the *ſerpent*, and the *old ſerpent*, yet why he ſhould be called the *moſt ſubtle beaſt of the field*, we cannot conceive; neither will the puniſhment inflicted on the ſerpent ſuffer us to doubt, but that a ſerpent's body at leaſt was employed in the tranſaction.

The nature of the forbidden fruit is another circumſtance in this relation that has occaſioned no leſs variety of conjectures. The Rabbins believe it was the vine; others that it was wheat; and others, from the circumſtance of Adam and Eve's covering themſelves with fig-leaves immediately after their tranſgreſſion, tell us, that this fruit muſt have been the fig; ſome think it was the cherry; and the generality of the Latins will have it to be the apple.

Thoſe who admire allegorical interpretations, will have the forbidden fruit to have been no other than the ſenſual act of generation, for which the puniſhment inflicted on the woman was the pain of child-bearing. But this opinion has not the leaſt foundation in the words of Moſes, eſpecially if we conſider that Adam knew not his wife till after their expulſion out of Paradiſe.

Many have been the ſuppoſitions and conjectures upon this ſubject in general; and ſome have ſo far indulged their fancy in the circumſtances of the fall, that they have perverted the whole narration of Moſes into a fable full of the moſt ſhameful extravagancies.

FALLACY, a deception, fraud, or falſe appearance.

The Epicureans deny that there is any ſuch thing as a fallacy of the ſenſes; for, according to them, all our ſenſations and perceptions, both of ſenſe and phantaſy, are true; whence they make ſenſe the primary criterion of truth.

The Carteſians, on the other hand, maintain, that we ſhould ſuſpect as falſe, or at moſt as dubious, every thing that preſents itſelf to us by means only of the external ſenſes, becauſe they frequently deceive us. They add, that our ſenſes, as being fallacious, were never given us by nature for the diſcovery of truth, or the contemplation of the principles of things; but only for pointing out to us what things are convenient or hurtful to our bodies.

The Peripatetics keep a middle courſe. They ſay, that if a ſenſible object be taken in its common or general view, the ſenſe cannot be deceived about it; but that if the object be taken under its ſpecific view, the ſenſe may be miſtaken about it, from the want of the diſpoſitions neceſſary to a juſt ſenſation, as a diſorder in the organ, or any thing uncommon in the medium: thus, in ſome diſorders of the eye, all objects appear yellow; a ſtick in water appears broken or crooked, &c.

FALLING-SICKNESS, or EPILEPSY. See MEDICINE-*Index*.

FALLING-STARS. See STAR.

FALLOPIAN TUBES, in anatomy, two ducts ariſing from the womb, one on each ſide of the fundus, and thence extended to the ovaries, having a conſiderable ſhare in conception. They are called *tubæ*, from their form, which bears ſome reſemblance to a trumpet; and their denomination, *Fallopianæ*, they take from Gabriel Fallopius, mentioned in the next article. See ANATOMY, p. 740. col. 2.

FALLOPIUS (Gabriel), a moſt celebrated phyſician and anatomiſt, was born at Modena in Italy, in the year 1523, and deſcended of a noble family. He made ſeveral diſcoveries in anatomy, one of which was that of the tubes, called from him the *Fallopian tubes*. He travelled through the greateſt part of Europe, and obtained the character of being one of the ableſt phyſicians of his age. He was made profeſſor of anatomy at Piſa in the year 1548, and at Padua in the year 1551: here he died in 1562, aged 39. His writings, which are numerous, were firſt printed ſeparately, and afterwards collected under the title of "Opera genuina omnia, tam practica quam theoretica, in tres tomos diſtributa." They were printed at Venice in 1585, and in 1606; at Francfort in 1600, *cum operum appendice*; and in 1606, in folio.

FALLOW, a pale red-colour, like that of brick half-burnt; ſuch is that of a fallow-deer.

FALLOW-Field, or *Fallow-ground*; land laid up, or that has been untilled for a conſiderable time.

FALLOWING *of* LAND, a particular method of improving land. See AGRICULTURE, n° 14, 15, 185.

FALMOUTH, a port-town of Cornwall in England, ſituated in W. Long. 5. 30. N. Lat. 50. 15. on a fine bay of the Engliſh channel. It is the richeſt and moſt trading town of the county, and larger than any three of its boroughs that ſend members to parliament. It is ſo commodious a harbour, that ſhips of the greateſt burden come up to its quay. It is guarded by the caſtle of St Mawes and Pendennis, on a high rock at the entrance; and there is ſuch ſhelter in the many creeks belonging to it, that the whole royal navy may ride ſafe here in any wind, it being next to Plymouth and Milford-Haven, the beſt road for ſhipping in Great Britain. It is well-built; and its trade is conſiderably increaſed ſince the eſtabliſhment of the packet-boats here for Spain, Portugal, and the Weſt-Indies, which not only bring vaſt quantities of gold in ſpecie and in bars, on account of the merchants in London; but the Falmouth merchants trade with the Portugueſe in ſhips of their own, and they have a great ſhare alſo in the gainful pilchard trade. The cuſtom-houſe for moſt of the Corniſh towns, as well as the head collector, is ſettled here, where the duties, including thoſe of the other ports, are very conſiderable. It is a corporation, governed by a mayor and aldermen. Here is a market on Thurſday, and fairs July 27, and October 30.

FALSE, in general, ſomething contrary to truth, or not what it ought to be: thus we ſay a falſe action, falſe weights, falſe claim, &c.

FALSE Action, if brought againſt one whereby he is caſt into priſon, and dies pending the ſuit, the law gives no remedy in this caſe, becauſe the truth or falſehood of the matter cannot appear before it is tried: and if the plaintiff is barred, or non-ſuited at common law, regularly all the puniſhment is amercement.

FALSE Impriſonment, is a treſpaſs committed againſt a perſon, by arreſting and impriſoning him without juſt cauſe, contrary to law; or where a man is unlawfully detained without legal proceſs: and it is alſo uſed for a writ which is brought for this treſpaſs. If a perſon be any way unlawfully detained, it is falſe impriſonment; and conſiderable damages are recoverable in thoſe actions.

FALSE News, ſpreading of, in order to make diſcord between the king and nobility, or concerning any great man of the realm, is puniſhable by common law with fine and impriſonment; which is confirmed by ſtatutes Weſtm. 1. 3 Edw. I. cap. 34. 2 Ric. II. ſtat. 1. cap. 5. & 12 Ric. II. cap. 11.

FALSE Oath. See PERJURY.

FALSE Prophecy. See PROPHECY.

FALSE Quarter, in farriery. See QUARTERS.

FALSE Bay, a bay lying to the eaſtward of the Cape of Good Hope; frequented by veſſels during the prevalence of the north-weſterly winds, which begin to exert their influence in May, and render it dangerous to remain in Table Bay. It is terminated to the eaſtward by Falſe Cape, and to the weſtward by the Cape of Good Hope. It is 18 miles wide at its entrance, and the two capes bear due eaſt and weſt from each other.

FALSI CRIMEN, in the civil law, is fraudulent ſubornation or concealment, with deſign to darken or hide the truth, and make things appear otherwiſe than they are. The *crimen falſi* is committed, 1. By words, as when a witneſs ſwears falſely. 2. By writing, as when a man antedates a contract, or the like. 3. By deed, as when he ſells by falſe weights and meaſures.

FALSIFY, in law, is uſed for proving any thing to be falſe. Hence we find

FALSIFYING a record, for ſhowing it to be erroneous. Thus lawyers teach, that a perſon purchaſing land of another, who is afterwards outlawed of felony, &c. may falſify the record, not only as to the time wherein the felony is ſuppoſed to have been committed, but alſo as to the point of the offence. But where a man is found guilty by verdict, a purchaſer cannot falſify as to the offence; though he may for the time where the party is found guilty generally in the indictment, becauſe the time is not material upon evidence.

EALSTAFF. See FASTOLFF.

FALX, in anatomy, a part of the dura mater, deſcending between the two hemiſpheres of the brain, and ſeparating the fore-part from the hinder. It is called *falx*. i. e. "ſickle," becauſe of its curvature, occaſioned by the convexity of the brain. It divides the brain as low as the corpus calloſum.

FAMA CLAMOSA, in the judicial procedure of the church of Scotland, a ground of action before a preſbytery againſt one of its members, independant of any regular complaint by a particular accuſer. See PRESBYTERY.

Any perſon who is of a good character, may give to the preſbytery a complaint againſt one of their members; but the preſbytery is not to proceed to the citation of the perſon accuſed, until the accuſer under his hand gives in the complaint, with ſome account of its probability, and undertakes to make out the libel, under the pain of being conſidered as a ſlanderer. When ſuch an accuſation is brought before them, they are obliged candidly to examine the affair. But, beſides this, the preſbytery conſiders itſelf obliged to proceed againſt any of its members, if a fama clamoſa of the ſcandal is ſo great that they cannot be vindicated unleſs they begin the proceſs. This they can do without any particular accuſer, after they have inquired into the riſe, occaſion, and authors, of this report. It is a maxim in the kirk of Scotland, that religion muſt ſuffer if the ſcandalous or immoral actions of a miniſter are not corrected. And wherever a miniſter is reputed guilty of any immortality (although before the moſt popular preacher in the kingdom), none almoſt will attend upon his miniſtry. Therefore the preſbytery, for the ſake of religion, is obliged to proceed againſt a miniſter in caſe of a fama clamoſa. This, however is generally done with great tenderneſs. After they have conſidered the report raiſed againſt him, then they order him to be cited, draw out a full copy of what is reported, with a liſt of the witneſſes names to be led for proving this allegation. He is now to be formally ſummoned to appear before them; and he has warning given him, at leaſt ten days before the time of his compearance, to give in his anſwers to what is termed the *libel;* and the names of the witneſſes ought alſo to be ſent him. If at the time appointed the miniſter appear, the libel is to be read to him, and his anſwers are alſo to be read. If the libel be found relevant, then the preſbytery is to endeavour to bring him to a confeſſion. If the matter confeſſed be of a ſcandalous nature, ſuch as uncleanneſs, the preſbytery generally depoſe him from his office, and appoint him in due time to appear before the congregation where the ſcandal was given, and to make public confeſſion of his crime and repentance. If a miniſter abſent himſelf by leaving the place, and be contumacious, without making any relevant excuſe, a new citation is given him, and intimation is made at his own church when the congregation is met, that he is to be holden as confeſſed, ſince he refuſed to appear before them; and accordingly he is depoſed from his office.

FAME, a heathen goddeſs, celebrated chiefly by the poets. She is feigned to have been the laſt of the race of Titans produced by the earth, to have her palace in the air, and to have a vaſt number of eyes, ears, and tongues. She is mentioned by Heſiod, and particularly deſcribed by Ovid and Virgil.

FAMES CANINA, the ſame with BULIMY.

FAMIA, or AFAMIA, the modern name of one of the ancient Apameas. See APAMEA.

FAMILIARS of the INQUISITION, perſons who aſſiſt in apprehending ſuch as are accuſed, and carrying them to priſon. They are aſſiſtants to the inquiſitor, and called *familiars,* becauſe they belong to his family. In ſome provinces of Italy they are called *croſs-bearers,* and in others the *ſcholars of St Peter the martyr;* and they wore a croſs before them on the outſide garment. They are properly bailiffs of the inquiſition; and the vile office is eſteemed ſo honourable, that noblemen in the kingdom of Portugal have been ambitious of belonging to it. Nor is this ſurpriſing, when it is conſidered that Innocent III. granted very large indulgences and privileges to theſe familiars; and that the ſame plenary indulgence is granted by the pope to every ſingle exerciſe of this office, as was granted by the Lateran counil to thoſe who ſuccoured the Holy Land. When ſeveral perſons are to be taken up at the ſame time, theſe familiars are commanded to order matters that they may know nothing of one another's being apprehended; and it is related, that a father and his three ſons, and three daughters, who lived together in the ſame houſe, were carried priſoners to the inquiſition without knowing any thing of one another's being there till ſeven years afterwards, when they that were alive were releaſed by an act of faith.

FAMILY, denotes the perſons that live together in one houſe, under the direction of one head or chief manager. It alſo ſignifies the kindred or lineage of a perſon; and is uſed by old writers for a hide or portion of land ſufficient to maintain one family. See HIDE.

FAMILY, in natural hiſtory, a term uſed by authors to expreſs any order of animals, or other natural productions of the ſame claſs. See CLASS and ORDER.

Famine, Fan.

FAMINE, dearth, or ſcarcity of food. For preſervatives againſt hunger in times of famine, ſee the article HUNGER.

FAN, a machine uſed to raiſe wind, and cool the air by agitating it.

That the uſe of the fan was known to the ancients is very evident from what Terence ſays,

Cape hoc flabellum, *et ventulum huic ſic facito;*

and from Ovid, Art. Amand. i. 161.

Profuit et tenues ventos moviſſe flabello.

The fans of the ancients were made of different materials; but the moſt elegant were compoſed of peacock's feathers, or perhaps painted, ſo as to repreſent a peacock's tail.

The cuſtom which now prevails among the ladies of wearing fans, was borrowed from the eaſt, where the hot climate renders the uſe of fans and umbrellas almoſt indiſpenſable.

In the eaſt they chiefly uſe large fans made of feathers, to keep off the ſun and the flies. In Italy and Spain they have a large ſort of ſquare fans, ſuſpended in the middle of their apartments, and particularly over the tables; theſe, by a motion at firſt given them, which they retain a long time on account of their perpendicular ſuſpenſion, help to cool the air and drive off flies.

In the Greek church, a fan is put into the hands of the deacons in the ceremony of their ordination, in alluſion to a part of the deacon's office in that church, which is to keep the flies off the prieſts during the celebration of the ſacrament.

What is called a *fan* amongſt us and throughout the chief parts of Europe, is a thin ſkin, or piece of paper, taffety, or other light ſtuff, cut ſemicircularly, and mounted on ſeveral little ſticks of wood, ivory, tortoiſe-ſhell, or the like. If the paper be ſingle, the ſticks of the mounting are paſted on the leaſt ornamental ſide: if double, the ſticks are placed betwixt them. Before they proceed to place the ſticks, which they call *mounting the fan*, the paper is to be plaited in ſuch manner, as that the plaits may be alternately inward and outward.

It is in the middle of each plait, which is uſually about half an inch broad, that the ſticks are to be paſted; and theſe again are to be all joined and rivetted together at the other end; they are very thin, and ſcarce exceed one-third of an inch in breadth; and where they are paſted to the paper, are ſtill narrower, continuing thus to the extremity of the paper. The two outer ones are bigger and ſtronger than the others.

The number of ſticks rarely exceeds 22. The ſticks are uſually provided by the cabinet makers or toymen; the fan-painters plait the papers, paint, and mount them.

The common painting is either in colours or gold-leaf, applied on a ſilvered ground, both prepared by the gold-beaters. Sometimes they paint on a gold ground, but it is rarely; true gold being too dear, and falſe too paltry. To apply the ſilver leaves on the paper, they uſe a compoſition, which they pretend is a great ſecret, but which appears to be no other than gum Arabic, ſugar-candy, and a little honey melted in common water, and mixed with a little brandy. This compoſition is laid on with a ſponge; then laying the ſilver leaves thereon, and preſſing them gently down with a linen ball ſtuffed with cotton, they catch hold, and adhere together. When, inſtead of ſilver, gold ground is laid, the ſame method is obſerved. The ground being well dried, a number of the papers are well beaten together on a block, and by this means the ſilver or gold get a luſtre as if they had been burniſhed.

Fan ‖ Fanſhaw.

FAN is alſo an inſtrument to winnow corn.—The machine uſed for this purpoſe by the ancients ſeems to have been of a form ſimilar to ours. The fan, which Virgil calls *myſtica vannus Iacchi*, was uſed at initiations into the myſteries of the ancients: For as the perſons who were initiated into any of myſteries, were to be particularly good, this inſtrument, which ſeparates the wheat from the chaff, was the fitteſt emblem that could be of ſetting apart the good and virtuous from the vicious and uſeleſs part of mankind. It is figuratively applied in a ſimilar manner in Luke iii. 17.

FANATICS, wild, enthuſiaſtic, viſionary perſons, who pretend to revelation and inſpiration.

The ancients called thoſe *fanatici* who paſſed their time in temples (*fana*), and being often ſeized with a kind of enthuſiaſm, as if inſpired by the divinity, ſhowed wild and antic geſtures. Prudentius repreſents them as cutting and ſlaſhing their arms with knives. Shaking the head was alſo common among the fanatici; for Lampridius informs us, that the emperor Heliogabulus was arrived to that pitch of madneſs, as to ſhake his head with the gaſhed fanatics. Hence the word was applied among us to the Anabaptiſts, Quakers, &c. at their firſt riſe, and is now an epithet given to the modern prophets, muggletonians, &c.

FANCY, or imagination. See IMAGINATION.

FANIONS, in the military art, ſmall flags carried along with the baggage.

FANSHAW (Sir Richard), famous for his embaſſies and writings, was the tenth and youngeſt ſon of Sir Henry Fanſhaw of Ware Park in Hertfordſhire, where it is ſuppoſed he was born about the year 1607. He diſtinguiſhed himſelf ſo early by his abilities, that in 1635 he was taken into government-employments by King Charles I. and ſent reſident to the court of Spain; whence being recalled in the beginning of the troubles in 1641, he adhered to the royal intereſt, and was employed in ſeveral important matters of ſtate. During his vacant hours he wrote divers poems, and made ſeveral tranſlations. At the reſtoration it was expected he would have been made one of the ſecretaries of ſtate: however, he was made maſter of the requeſts; a ſtation in thoſe times of conſiderable profit. Afterwards, on account of his ſkill in the Latin language, he was made ſecretary for that tongue. In 1661, he was ſent envoy to the king of Portugal. In 1662, he was again ſent to that court with the title of *ambaſſador*, and negociated the marriage of his maſter king Charles II. with the infata Donna Catherina. Upon his return he was made one of the privy-council. In 1664, he was ſent ambaſſador to both the courts of Spain and Portugal; at which time the foundation of peace betwixt thoſe crowns and England was laid by him. His conduct during his former employments in thoſe courts gained him ſuch high eſteem there, that his reception was magnificent, exceeding all that were before, which thoſe kings declared was not to be a precedent to ſucceeding ambaſſadors. He died at Madrid in 1666, on the very day he had fixed for ſetting out on his return to England. Beſides ſome original poems, and other tranſlations, he publiſhed a tranſlation of Bathiſta Guarini's *Paſtor Fido*, and another of the *Luſiad* of Camoen's. Among his poſthumous publications are, "Letters during his embaſſies in Spain and Portugal; with his life prefixed."

FANTASIA, in the Italian muſic, ſignifies *fancy;* and is uſed for a compoſition, wherein the compoſer ties himſelf to no particular time, but ranges according as his fancy leads, amidſt various movements, different airs, &c. This is otherwiſe called the *capricious ſtyle:* before ſonatas were uſed, there were many of this kind, ſome of which remain even now.

FANUM, among the Romans, a temple or place conſecrated to ſome deity. The deified men and women among the heathens had likewiſe their *fana*; even the great philoſopher Cicero erected one to his daughter Tullia.

Fanum Vacunæ, (anc. geog.), a village of the Sabines, ſituated between Cures and Mandela; where ſtood the temple of Vacuna, goddeſs of the idle or unemployed, in an old decayed ſtate; and hence the epithet *putre*, uſed by Horace Now called *Vocone* in the Eccleſiaſtic State.

FARANDMAN, a traveller, or merchant ſtranger, to whom, by the laws of Scotland, juſtice ought to be done with all expedition, that his buſineſs or journey be not hindered.

FARCE, was originally a droll, petty ſhow, or entertainment, exhibted by charlatans, and their buffoons, in the open ſtreet to gather the crowd together. —The word is French, and ſignifies literally, "forcemeat or ſtuffing." It was applied on this occaſion, no doubt, on account of the variety of jeſts, gibes, tricks, &c. wherewith the entertainment was interlarded. Some authors derive farce from the Latin *facetia;* others from the Celtic *farce*, "Mockery;" others from the Latin *farcire*, "to ſtuff."

At preſent it is removed from the ſtreet to the theatre; and inſtead of being performed by merry-andrews to amuſe the rabble, is acted by comedians, and becomes the entertainment of a polite audience. Poets have reformed the wildneſs of the primitive farces, and brought them to the taſte and manner of comedy. The difference between the two on our ſtage is, that comedy keeps to nature and probability, and therefore is confined to certain laws preſcribed by ancient critics; whereas farce diſallows of all laws, or rather ſets them aſide on occaſion. Its end is purely to make merry; and it ſticks at nothing which may contribute thereto, however wild and extravagant. Hence the dialogue is uſually low, the perſons of inferior rank, the fable or action trivial or ridiculous, and nature and truth every where heightened and exaggerated to afford the more palpable ridicule.

FARCIN, or Farcy, a diſeaſe in horſes, and ſometimes in oxen, &c. ſomewhat of the nature of a ſcabies or mange. See Farriery, ſect. xxiv.

FARDING-deal, the fourth part of an acre of land. See Acre.

FARE, moſt commonly ſignifies the money paid for a voyage, or paſſage by water; but, in London, it is what perſons pay for being conveyed from one part of the town to another in a coach or chair.

FAREWELL-cape, the moſt ſoutherly promontory of Greenland, in W. Long. 50°, and N. Lat. 60°.

FARIN, or Farm. See Farm.

FARINA, a Latin term ſignifying meal, or the flour of corn. See Corn.

Farina Fœcundans, among botaniſts, the ſuppoſed impregnating meal or duſt on the apices or antheræ of flowers. See Pollen.

The manner of gathering the farina of plants for microſcopical obſervations is this: Gather the flowers in the midſt of a dry ſunſhiny day when the dew is perfectly off, then gently ſhake off the farina, or lightly bruſh it off with a ſoft hair-pencil, upon a piece of white paper; then take a ſingle talc or iſinglaſs between the nippers, and, breathing on it, apply it inſtantly to the farina, and the moiſture of the breath will make that light powder ſtick to it. If too great a quantity be found adhering to the talc, blow a little of it off; and, if there is too little, breathe upon it again, and take up more. When this is done, put the talc into the hole of a ſlider, and, applying it to the microſcope, ſee whether the little grains are laid as you deſire; and if they are, cover them up with another talc, and fix the ring; but be careful that the talcs do not preſs upon the farina in ſuch a manner as to alter its form.

FARLEU, money paid by the tenants in the weſt of England, in lieu of a heriot. In ſome manors of Devonſhire, farleu is often diſtinguiſhed to be the beſt goods, as heriot is the beſt beaſt, payable at the death of a tenant.

FARM, farin, or *Ferm, (Ferma)*, in law, ſignifies a little country meſſuage or diſtrict; containing houſe and land, with other conveniencies; hired, or taken by leaſe, either in writing, or parole under a certain yearly rent. See Lease.

This in divers parts is differently termed: in the north, it is a *tack*; in Lancaſhire, a *fermeholt*; in Eſſex, a *wike*, &c.

In the corrupted Latin, *firma* ſignified a place incloſed or ſhut in: whence, in ſome provinces, Menage obſerves, they call *cloſerie*, or *cloſure*, what in others they call a *farm*. Add, that we find *locare ad firman*, to ſignify to let to *farm*; probably on account of the ſure hold the tenant here has in compariſon of tenants at will.

Spelman and Skinner, however, chooſe to derive the word *farm* from the Saxon *fearme*, or *feorme*, that is, *victus*, "proviſion;" by reaſon the country people and tenants anciently paid their rents in victuals and other neceſſaries, which were afterwards converted into the payment of a ſum of money. Whence a *farm* was originally a place that furniſhed its landlord with proviſions. And among the Normans they ſtill diſtinguiſh between farms that pay in kind, *i. e.* proviſions, and thoſe which pay in money; calling the former ſimply *fermes*, and the latter *blanche ferme*, "white ferm."

Spelman ſhows, that the word *firma*, anciently ſignified not only what we now call a *farm*, but alſo a feaſt or entertainment, which the farmer gave the proprietor or landlord, for a certain number of days, and at a certain rate, for the lands he held of him. Thus *fearme* in the laws of king Canute is rendered by Mr. Lambard, *victus*: and thus we read of *reddere firmam unius noctis*, and *reddebat unum diem de firma*; which denote proviſion for a night and day, the rents about the time of the conqueſt being all paid in proviſions; which cuſtom is ſaid to have been firſt altered under king Henry I. We alſo ſay *to farm* duties, impoſts, &c.

Culture of a Farm. See Agriculture.

Farm, as connected with gardening, and ſuſceptible of embelliſhment. See Gardening.

In ſpeculation, it might have been expected that the firſt eſſays of improvement ſhould have been on a farm, to make it both advantageous and delightful; but the fact was otherwiſe: a ſmall plot was appropriated to pleaſure; the reſt was reſerved for profit only. And this may, perhaps, have been a principle cauſe of the vicious taſte which long prevailed in gardens. It was imagined that a ſpot ſet apart from the reſt ſhould not be like them: the conceit introduced deviations from nature, which were afterwards carried to ſuch an exceſs, that hardly any objects truly rural were left within an incloſure, and the view of thoſe without was generally excluded. The firſt ſtep, therefore, towards a reformation, was by opening the garden to the country, and that immediately led to aſſimilating them; but ſtill the idea of a ſpot appropriated to pleaſure only prevailed, and one of the lateſt improvements has been to blend the uſeful with the agreeable; even the ornamental farm was prior in time to the more rural; and we have at laſt returned to ſimplicity by force of refinement.

Of a paſtoral farm.

1. The ideas of paſtoral poetry ſeem now to be the ſtandard of that ſimplicity; and a place conformable to them is deemed a farm in its utmoſt purity. An alluſion to them evidently enters into the deſign of the Leaſowes (A), where they appear ſo lovely as to endear the memory of their author; and juſtify the reputation of Mr. Shenſtone, who inhabited, made and celebrated the place: it is a perfect picture of his mind, ſimple, elegant, and amiable; and will always ſuggeſt a doubt, whether the ſpot inſpired his verſe, or whether, in the ſcenes which he formed, he only realized the paſtoral images which abound in his ſongs. The whole is in the ſame taſte, yet full of variety; and, except in two or three trifles, evey part is rural and natural. It is literally a grazing farm lying round the houſe; and a walk, as unaffected and as unadorned as a common field-path, is conducted through the ſeveral encloſures. But for a detail of the plan and ſcenery, as illuſtrative of the preſent ſubject, the reader is referred to the particular deſcription of the Leaſowes publiſhed by the late Mr. Dodſley. We ſhall only take notice of one or two circumſtances independent on the general delineation.

The art with which the diviſions between the fields are diverſified is one of them. Even the hedges are diſtinguiſhed from each other; a common quickſet fence is in one place the ſeparation; in another, it is a lofty hedge-row, thick from the top to the bottom; in a third, it is a continued range of trees, with all their ſtems clear, and the light appearing in the intervals between their boughs, and the buſhes beneath them; in others, theſe lines of trees are broken, a few groupes only being left at different diſtances; and ſometimes a wood, a grove, a coppice, or a thicket, is the apparent boundary, and by them both the ſhape and the ſtyle of the encloſures are varied.

The inſcriptions, which abound in the place, are another ſtriking peculiarity: they are well known and juſtly admired; and the elegance of the poetry, and the aptneſs of the quotations, atone for their length and their number. But, in general, inſcriptions pleaſe no more than once: the utmoſt they can pretend to, except when their alluſions are emblematical, is to point out the beauties, or deſcribe the effects, of the ſpots they belong to; but thoſe beauties and thoſe effects muſt be very faint, which ſtand in need of the aſſiſtance. Inſcriptions, however, to commemorate a departed friend, are evidently exempt from the cenſure; the monuments would be unintelligible without them; and an urn, in a lonely grove, or in the midſt of a field, is a favourite embelliſhment at the Leaſowes: they are indeed among the principal ornaments of the place; for the buildings are moſtly mere ſeats, or little root-houſes; a ruin of a priory is the largeſt, and that has no peculiar beauty to recommend it: but a multiplicity of objects are unneceſſary in a farm; the country it commands is full of them; and every natural advantage of the place within itſelf has been diſcovered, applied, contraſted, and carried to the utmoſt perfection, in the pureſt taſte, and with inexhauſtible fancy.

Among the ideas of paſtoral poetry which are here introduced, its mythology is not omitted: but the alluſions are both to ancient and to modern fables; ſometimes to the fairies; and ſometimes to the naiads and muſes. The objects alſo are borrowed partly from the ſcenes which this country exhibited ſome centuries ago, and partly from thoſe of Arcadia: the priory, and a Gothic ſeat, ſtill more particularly characteriſed by an inſcription in obſolete language and the black letter, belong to the one; the urns, Virgil's obeliſk, and a ruſtic temple of Pan, to the other. All theſe alluſions and objects are indeed equally rural: but the images in an Engliſh and a claſſical eclogue are not the ſame; each ſpecies is a diſtinct imitative character. Either is proper; either will raiſe the farm it is applied to above the ordinary level; and within the compaſs of the ſame place both may be introduced: but they ſhould be ſeparate: when they are mixed, they counteract one another; and no repreſentation is produced of the times and the countries they refer to. A certain diſtrict ſhould therefore be allotted to each, that all the fields which belong to the reſpective characters may lie together, and the correſponding ideas be preſerved for a continuance.

Of an ancient farm.

2. In ſuch an aſſortment, the more open and poliſhed ſcenes will generally be given to the Arcadian ſhepherd; and thoſe in a lower degree of cultivation, will be thought more conformable to the manners of the ancient Britiſh yeomanry. We do not conceive that the

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(A) In Shropſhire, between Birmingham and Stourbridge.

the country in their time was entirely cleared, or diſtinctly divided ; the fields were ſurrounded by woods, not by hedges ; and if a conſiderable tract of improved land lay together, it ſtill was not ſeparated into a number of incloſures. The ſubjects, therefore, proper to receive this character, are thoſe in which cultivation ſeems to have encroached on the wild, not to have ſubdued it ; as the bottom of a valley in corn, while the ſides are ſtill overgrown with wood ; and the outline of that wood indented by the tillage creeping more or leſs up the hill. But a glade of graſs, thus circumſtanced, does not peculiarly belong to the ſpecies : that may occur in a park or paſtoral farm ; in this, the paſtures ſhould rather border on a waſte or a common : if large, they may be broken by ſtraggling buſhes, thickets, or coppices ; and the ſcattered trees ſhould be beſet with brambles and briars. All theſe are circumſtances which improve the beauty of the place ; yet appear to be only remains of the wild, not intended for embelliſhment. Such interruptions muſt, however, be leſs frequent in the arable parts of the farm ; but there the opening may be divided into ſeveral lands, diſtinguiſhed, as in common fields, only by different ſorts of grain. Theſe will ſufficiently break the ſameneſs of the ſpace ; and tillage does not furniſh a more pleaſing ſcene, than ſuch a ſpace ſo broken, if the extent be moderate, and the boundary beautiful.

As much wood is eſſential to the character, a ſpot may eaſily be found, where turrets riſing above the covert, or ſome arches ſeen within it, may have the reſemblance of a caſtle or an abbey. The partial concealment is almoſt neceſſary to both : for to accord with the age, the buildings muſt ſeem to be entire ; the ruins of them belong to later days : the diſguiſe is, however, advantageous to them as objects ; none can be imagined more pictureſque, than a tower boſomed in trees, or a cluſter appearing between the ſtems and the branches. But the ſuperſtitions of the times furniſh other objects which are more within compaſs : hermitages were then real : ſolitary chapels were common, many of the ſprings of the country being deemed holy wells, were diſtinguiſhed by little Gothic domes built over them ; and every hamlet had its croſs ; even this, when perfect, ſet on a little ruſtic pillar, and that raiſed upon a baſe of circular ſteps, may in ſome ſcenes be conſiderable : if a ſituation can be found for a May-pole, whence it would not obtrude itſelf on every view, that alſo might not be improper ; and an ancient church, however unwelcome it may be when it breaks into the deſign of a park or a garden, in ſuch a farm as this would be a fortunate accident : nor would the old yew in the church-yard be indifferent ; it would be a memorial of the times when it was uſeful.

Many other objects, ſignificant of the manners of our anceſtors, might perhaps, upon recollection, occur ; but theſe are amply ſufficient for a place of conſiderable extent ; and cottages muſt abound in every age and every country ; and may therefore be introduced in different forms and poſition. Large pieces of water are alſo particularly proper ; and all the varieties of rills are conſiſtent with every ſpecies of farm. From the concurrence of ſo many agreeable circumſtances in this, be the force or the effect of the character what it may, a number of pleaſing ſcenes may be exhibited either in a walk or riding, to be contraſted to thoſe which in another part of the place may be formed on Arcadian ideas ; or even to be ſubſtituted in their ſtead, if they are omitted.

Of a ſimple farm.

3. A part may alſo be free from either of theſe imitative characters, and laid out in a common ſimple farm. Some of the greateſt beauties of nature are to be found in the fields, and attend an ordinary ſtate of cultivation : wood and water may there be exhibited in ſeveral forms and diſpoſions ; we may enlarge or divide the incloſures ; and give them ſuch ſhapes and boundaries as we pleaſe ; every one may be an agreeable ſpot ; together, they may compoſe beautiful views ; the arable, the paſture, and the mead, may ſucceed one another ; and now and then a little wild may be intermixed without impropriety ; every beauty, in ſhort, which is not unuſual in an incloſed country, whether it ariſe from neglect or improvement, is here in its place.

The buildings, alſo, which are frequent in ſuch a country, are often beautiful objects ; the church and the manſion are conſiderable ; the farm-yard itſelf, if an advantageous ſituation be choſen for it ; if the ricks, and the barns, and the out-houſes, are ranged with any deſign to form them into groupes, and if they are properly blended with trees ; may be made a pictureſque compoſition. Many of them may be detached from the groupe, and diſperſed about the grounds : the dove-cote ; or the diary, may be ſeparated from the reſt ; they may be elegant in their forms, and placed wherever they will have the beſt effect. A common barn, accompanied by a clump, is ſometimes pleaſing at a diſtance ; A dutch barn is ſo when near ; and an hay-ſtack is generally an agreeable circumſtance in any poſition. Each of theſe may be ſingle ; and beſides theſe, all kinds of cottages are proper. Among ſo many buildings, ſome may be converted to other purpoſes than their conſtruction denotes ; and, whatever be their exterior, may within be made agreeable retreats, for refreſhment, indulgence, or ſhelter.

With ſuch opportunities of improvement, even to decoration within itſelf, and with advantages of proſpect into the country about it, a ſimple farm may undoubtedly be delightful. It will be particularly acceptable to the owner, if it be cloſe to his park or his garden :- the objects which conſtantly remind him of his rank, impoſe a kind of conſtraint ; and he feels himſelf relieved, by retiring ſometimes from the ſplendor of a ſeat into the ſimplicity of a farm : it is more than a variety of ſcene ; it is a temporary change of ſituation in life, which has all the charms of novelty, eaſe, and tranquillity, to recommend it. A place, therefore, can hardly be deemed perfect, which is not provided with ſuch a retreat. But if it be the whole of the place it ſeems inadequate to the manſion : a viſitor is diſappointed ; the maſter is diſſatisfied, he is not ſufficiently diſtinguiſhed from his tenants ; he miſſes the appendages incidental to his ſeat and his fortune ; and is hurt at the ſimilarity of his grounds with the country about them. A paſtoral or an ancient farm is a little above the common level ; but even theſe, if brought cloſe up at the door, ſet the houſe in a field, where it always appears to be neglected and naked. Some degree of poliſh and ornament is expected in its immediate environs ; and a garden, though it be but a ſmall one, ſhould be interpoſed between the manſion and any ſpecies of farm.

Of an ornamented farm.

4. A ſenſe of the propriety of ſuch improvements about a ſeat, joined to a taſte for the more ſimple delights of the country, probably ſuggeſted the idea of an *ornamented farm,* as the means of bringing every rural circumſtance within the verge of a garden. This idea has been partially executed very often; but no where, perhaps, ſo completely, and to ſuch an extent, as at Woburn farm, (near Weybridge in Surry.) The place contains 150 acres: of which near 35 are adorned to the higheſt degree; of the reſt, about two thirds are in paſture, and the remainder is in tillage. The decorations are, however, communicated to every part: for they are diſpoſed along the ſides of a walk, which, with its appendages, forms a broad belt round the grazing-grounds; and it is continued, though on a more contracted ſcale, through the arable. This walk is properly garden; all within it is farm; the whole lies on the two ſides of a hill, and on a flat at the foot of it: the flat is divided into corn-fields; the paſtures occupy the hill; they are ſurrounded by the walk, and croſſed by a communication carried along the brow, which is alſo richly dreſſed, and which divides them into two lawns, each completely encompaſſed with garden.

Theſe are in themſelves delightful; the ground in both lies beautifully; they are diverſified with clumps and ſingle trees; and the buildings in the walk ſeem to belong to them. On the top of the hill is a large octagon ſtructure; and, not far from it, the ruin of a chapel. To one of the lawns the ruin appears, on the brow of a gentle aſcent, backed and grouped with wood; from the other is ſeen the octagon, upon the edge of a ſteep fall, and by the ſide of a pretty grove, which hangs down the declivity. This lawn is further embelliſhed by a neat Gothic building; the former by the houſe, and the lodge at the entrance; and in both, other objects of leſs conſequence, little ſeats, alcoves, and bridges, continually occur.

The buildings are not, however, the only ornaments of the walk; it is ſhut out from the country, for a conſiderable length of the way, by a thick and lofty hedge-row, which is enriched with woodbine, jeſſamine, and every odoriferous plant whoſe tendrils will entwine with the thicket. A path, generally of ſand or gravel, is conducted in a waving line, ſometimes cloſe under the hedge, ſometimes at a little diſtance from it; and the turf on either hand is diverſified with little groupes, of ſhrubs, of firs, or the ſmalleſt trees, and often with beds of flowers: theſe are rather too profuſely ſtrewed, and hurt the eye by their littleneſſes; but then they repleniſh the air with their perfumes, and every gale is full of fragancy. In ſome parts, however, the decoration is more chaſte; and the walk is carried between larger clumps of evergreens, thickets of deciduous ſhrubs, or ſtill more conſiderably open plantations. In one place it is entirely ſimple, without any appendages, any gravel, or any ſunk fence to ſeparate it from the lawn; and is diſtinguiſhed only by the richneſs of its verdure, and the nicety of its preſervation. In the arable part it is alſo of green ſward, following the direction of the hedges about the ſeveral incloſures: theſe hedges are ſometimes thickened with flowering ſhrubs; and in every corner or vacant ſpace, is a roſary, a cloſe or an open clump, or a bed of flowers: but if the parterre has been rifled for the embelliſhment of the fields, the country has on the other hand been ſearched for plants new in a garden; and the ſhrubs and the flowers which uſed to be deemed peculiar to the one, have been liberally transferred to the other; while their number ſeems multiplied by their arrangement in ſo many and ſuch different diſpoſitions. A more moderate uſe of them would, however, have been better; and the variety more pleaſing, had it been leſs licentious.

But the exceſs is only in the borders of the walk; the ſcenes through which it leads are truly elegant, every where rich, and always agreeable. A peculiar cheerfulneſs overſpreads both the lawns, ariſing from the number and the ſplendor of the objects with which they abound, the lightneſs of the buildings, the inequalities of the ground, and the varieties of the plantations. The clumps and the groves, though ſeparately ſmall, are often maſſed by the perſpective, and gathered into conſiderable groups, which are beautiful in their forms, their tints, and their poſitions. The brow of the hill commands two lovely proſpects: the one gay and extenſive, over a fertile plain, watered by the Thames, and broken by St Anne's Hill and Windſor Caſtle; a large mead, of the moſt luxuriant verdure, lies juſt below the eye, ſpreading to the banks of the river; and beyond it the country is full of farms, villas, and villages, and every mark of opulence and cultivation. The other view is more wooded: the ſteeple of a church, or the turrets of a ſeat, ſometimes riſe above the trees; and the bold arch of Walton Bridge is there a conſpicuous object, equally ſingular and noble. The incloſures on the flat are more retired and quiet; each is confined within itſelf; and all together they form an agreeable contraſt to the open expoſure above them.

With the beauties which enliven a garden are every where intermixed many properties of a farm: both the lawns are paſtured; and the lowings of the herds, the bleating of the ſheep, and the tinklings of the bell-wedder, reſound through all the plantations: even the clucking of poultry is not omitted; for a menagerie of a very ſimple deſign is placed near the Gothic building; a ſmall ſerpentine river is provided for the water-fowl; while the others ſtray among the flowering ſhrubs on the banks, or ſtraggle about the neighbouring lawn: and the corn-fields are the ſubjects of every rural employment which arable land from ſeed-time to harveſt can furniſh. But though ſo many of the circumſtances occur, the ſimplicity of a farm is wanting; that idea is loſt in ſuch a profuſion of ornament; a ruſticity of character cannot be preſerved amidſt all the elegant decorations which may be laviſhed on a garden.

FARMER, he that tenants a farm, or is leſſee thereof. Alſo generally every leſſee for life, years, or at will, is called *farmer.* As this word implies no myſtery, except it be that of huſbandry, huſbandman is the proper addition for a farmer.

FARMER, in mining, is the lord of the field, or one that farms the lot and cope of the king.

FARN ISLANDS, two groups of little iſlands and rocks, 17 in number, lying oppoſite to Bamborough caſtle in Northumberland. At low water the points of ſeveral others are viſible beſides the 17 juſt mentioned, ed. The neareſt iſland to the ſhore is called the *Houſe iſland*, and lies exactly one mile and 68 chains from the coaſt. The moſt diſtant is about ſeven or eight miles. Their produce is kelp, feathers, and a few ſeals, which the tenant watches and ſhoots for the ſake of the oil and ſkins. Some of them yield a little graſs that may ſerve to feed a cow or two; which the people tranſport over in their little boats. The largeſt or Houſe iſland is about one mile in compaſs, and has a fort and a lighthouſe. It contains about ſix or ſeven acres of rich paſture; and the ſhore abounds with good coals which are dug at the ebb of tide. St Cuthbert is ſaid to have paſſed the two laſt years of his life on this iſland. A priory of Benedictines was afterwards eſtabliſhed here, for ſix or eight monks, ſubordinate to Durham. A ſquare tower, the remains of a church, and ſome other buildings, are ſtill to be ſeen on this iſland; and a ſtone coffin, which is pretended to be that of St Cuthbert. At the north end of the iſle is a deep chaſm, from the top to the bottom of the rock, communicating with the ſea; through which, in tempeſtuous weather, the water is forced with great violence and noiſe, and forms a fine jet d'eau of 60 feet high. It is called by the inhabitants of the oppoſite coaſt, the *Churn*. One of the iſlands in the moſt diſtant groupe is called the *Pinnacles*, from ſome vaſt columnar rocks at the ſouth end, even at their ſides, flat at the tops, and entirely covered with guillemots and ſhags. The fowlers paſs from one to the other of theſe columns by means of a board, which they place from top to top, forming a narrow bridge over ſuch a dreadful gap that the very ſight of it ſtrikes one with horror.

FARNABIE (Thomas), ſon of a carpenter at London, born in 1575, ſtaid a ſhort while at Oxford; where being enticed to abandon his religion, he went to Spain, and was there educated in a college belonging to the Jeſuits. Being weary of their ſevere diſcipline, he went with Sir John Hawkins and Sir Francis Drake in their laſt voyage in 1595. He was afterwards a ſoldier in the Low Countries: but being reduced to great want, returned to England, where wandering about for ſome time under the name of *Thomas Bainraſe*, the anagram of his name, he ſettled at Mattock in Somerſetſhire, and taught a grammar-ſchool with good reputation. He removed to London, and opened a ſchool with large accommodations for young gentlemen. While he taught this ſchool, he was made maſter of arts at Cambridge, and incorporated into the univerſity of Oxford. Thence he removed, in 1636, to Seven-oaks in Kent; and taught the ſons of ſeveral noblemen and gentlemen, who boarded with him, with great ſucceſs, and grew rich. His works gained him reputation. Upon the breaking out of the civil commotions in 1641, he was caſt into priſon. It was debated in the houſe of commons, whether he ſhould be ſent to America; but this motion being rejected, he was removed to Ely-houſe in Holborn, and there he died in 1647. Mr Farnabie was a very eminent grammarian; and many writers have ſpoken with great approbation of his labours. M. Bayle in particular ſays, "His notes upon moſt of the ancient Latin poets have been of very great uſe to young beginners; being ſhort, learned, and deſigned chiefly to clear up the text."

FARNHAM, or FERNHAM; a town of Surry, and capital of the hamlet of its own name, 41 miles from London on the Wincheſter road. It is a large populous place, ſituated on the river Wey, and ſuppoſed to have its name from the fern which abounded here. It was given by the Weſt Saxon king Ethelbald to the ſee of Wincheſter; the biſhops of which have generally reſided in the caſtle here, in the ſummer time, ever ſince the reign of king Stephen, whoſe brother, its then biſhop, firſt built it. It was a magnificent ſtructure, with deep moats, ſtrong walls and towers at proper diſtances, and a fine park; but it is much decayed. The town, which has many handſome houſes, and well paved ſtreets, is governed by 12 maſters or burgeſſes, of whom two are bailiffs, (choſen annually). They have the profit of the fairs and markets, and the aſſize of bread and beer; and hold a court every three weeks, which has power of trying and determining all actions under 40s. From Michaelmas to Chriſtmas here is a good market for oats; and one of the greateſt wheat markets in England, eſpecially between All-Saints day and midſummer. The toll-diſh here was once reckoned worth 200 l. a year; but it is much diminiſhed, ſince the people about Chicheſter and Southampton began to ſend their meal to London by ſea. But this loſs is amply made up by the vaſt growth of hops here, of which there are 300 or 400 acres of plantations about this town, and they are ſaid to outdo the Kentiſh hop-yards both in quantity and quality. This town ſent members to parliament in the reign of Edward II. but never ſince. The magiſtrates have their privileges from the biſhop of Wincheſter, to whom they pay an acknowledgment of 12d. a-year. The market is on Thurſday: fairs, Holy Thurſday, June 24. and November 2. Here are a free ſchool, and a great market for Welſh hoſe.

FARNOVIANS, in eccleſiaſtical hiſtory, a ſect of Socinians, ſo called from Staniſlaus Farnovius, who ſeparated from the other Unitarians in the year 1568, and was followed by ſeveral perſons eminent for their learning. This ſect did not laſt long; for having loſt their chief, who died in 1615, it was ſcattered abroad and reduced to nothing. Farnovius was engaged by Goneſius to prefer the Arian ſyſtem to that of the Socinians, and conſequently aſſerted, that Chriſt had been produced out of nothing by the Supreme Being before the creation of this terreſtrial globe. His ſentiments concerning the Holy Ghoſt are not certainly known; however, it appears that he warned his diſciples againſt paying the tribute of religious worſhip to the Divine Spirit.

FARQUHAR (George), an ingenious poet and dramatic writer, the ſon of a clergyman in Ireland, was born at Londonderry in 1678. He was ſent to Trinity College, Dublin; but his volatile diſpoſition not reliſhing a college life, he betook himſelf to the ſtage; where, having dangerouſly wounded a brother-actor in a tragic ſcene, by forgetting to change his ſword for a foil, it ſhocked him ſo much that he left the Dublin theatre and went to London. Here he procured a lieutenant's commiſſion by the intereſt of the earl of Orrery; which he held ſeveral years, and gave many proofs both of courage and conduct. In 1698, he wrote his firſt comedy called *Love and a Bottle*; which, for its ſprightly dialogue and buſy ſcenes, was well received. In the beginning of the year 1700, which was the jubilee year at Rome, he brought out his *Conſtant Couple, or a Trip to the Jubilee:* and ſuited Mr Wilks's talents ſo well in the character of Sir Harry Wildair, that the player gained almoſt as much reputation as the poet. This tempted him to continue it in another comedy called *Sir Harry Wildair,* or *The ſequel of the Trip to the Jubilee*; in which Mrs Oldfield acquired great applauſe. In 1702, he publiſhed his Miſcellanies, which contain a variety of humorous ſallies of fancy. In 1703, appeared the *Inconſtant,* or *the Way to win him*; in 1704, a farce called the *Stage-coach*; in 1705, *The Twin Rivals*; and in 1706, the *Recruiting Officer,* founded on his own obſervations while on a recruiting party at Shrewſbury. His laſt comedy was the *Beaux Stratagem,* of which he did not live to enjoy the full ſucceſs. Mr Farquhar married in 1703. Before that time his manner of life had been rather diſſipated. The lady, therefore, who afterwards became his wife, having fallen violently in love with him, but judging that a gentleman of his humour would not eaſily be drawn into the trammels of matrimony, contrived to have it given out that ſhe was poſſeſſed of a large fortune; and finding means afterwards to let Mr Farquhar know her attachment to him, intereſt and vanity got the better of his paſſion for liberty, and the lady and he were united in the hymenial bands. But how great was his diſappointment, when he found all his proſpects overclouded ſo early in life (for he was then no more than 24), by a marriage from which he had nothing to expect but an annual increaſe of family, and an enlargement of expence in conſequence of it far beyond what his income would ſupport. Yet, to his honour be it told, though he found himſelf thus deceived in a moſt eſſential particular, he never was known once to upbraid his wife with it; but generouſly forgave an impoſition which love for him alone had urged her to, and even behaved to her with all the tenderneſs and delicacy of the moſt indulgent huſband. Mrs Farquhar, however, did not very long enjoy the happineſs ſhe had purchaſed by this ſtratagem; for the circumſtances that attended this union were in ſome reſpect perhaps the means of ſhortening the period of the captain's life. For, finding himſelf conſiderably involved in debt in conſequence of their increaſing family, he was induced to make application to a certain noble courtier, who had frequently profeſſed the greateſt friendſhip for him, and given him the ſtrongeſt aſſurances of his intended ſervices. This pretended patron repeated his former declarations; but, expreſſing much concern that he had nothing at preſent immediately in his power, adviſed him to convert his commiſſion into money to anſwer his preſent occaſions, and aſſured him that in a ſhort time he would procure another for him. Farquhar, who could not bear the thoughts of his wife and family being in diſtreſs, followed this advice, and ſold his commiſſioned; but, to his great mortification and diſappointment, found, on a renewal of his application to this inhuman nobleman, that he had either entirely forgotten, or had never intended to perform, the promiſe he had made him. This diſtracting fruſtration of all his hopes fixed itſelf ſo ſtrongly on our author's mind, that it ſoon brought on him a ſure, tho' not a very ſudden, declenſion of nature, which at length carried him off the ſtage of life in 1707, before he arrived at 30 years of age.—His comedies are ſo diverting, and the characters ſo natural, that his plays ſtill continue to be repreſented to full houſes.

FARRIER, one whoſe employment is to ſhoe horſes, and cure them when diſeaſed or lame.

FARRIERY,

THE art of preventing, curing, or palliating, the diſeaſes of horſes.

The practice of this uſeful art has been hitherto almoſt entirely confined to a ſet of men who are totally ignorant of anatomy and the general principles of medicine. It is not therefore ſurpriſing, that their preſcriptions ſhould be equally abſurd as the reaſons they give for adminiſtering them. It cannot indeed be expected that farriers, who are almoſt univerſally illiterate men, ſhould make any real progreſs in their profeſſion. They preſcribe draughts, they rowel, cauteriſe, &c. without being able to give any other reaſon for their practice, but becauſe their fathers did ſo before them. How can ſuch men deduce the cauſe of a diſeaſe from its ſymptoms, or form a rational method of cure, when they are equally ignorant of the cauſes of diſeaſes and the operation of medicines?

The miſerable ſtate of this uſeful art has determined us to ſelect, from the beſt authors, ſuch a ſyſtem of practice as ſeems to be formed on rational principles; this, we hope, will be a ſufficient apology for being ſo full upon this article.

SECT. I. *General Directions with regard to the Management of Horſes.*

1. IT ought to be laid down as a general rule, to give horſes as few medicines as poſſible; and by no means to comply with the ridiculous cuſtom of ſome, who are frequently bleeding, purging, and giving balls, though their horſes be in perfect health, and have no indication that requires ſuch treatment.

2. Proper management in their feeding, exerciſe, and dreſſing, will alone cure many diſorders, and prevent moſt; for the ſimplicity of a horſe's diet, which chiefly conſiſts of grain and herbage, when good in kind, and diſpenſed with judgment, ſecures him from theſe complicated diſorders which are the general effects of intemperance in the human body.

3. In France, Germany, and Denmark, horſes are ſeldom purged; there they depend much on alteratives; the uſe of the liver of antimony we have from the French, which is in general a good medicine for that purpoſe, and may, in many caſes, be ſubſtituted in the room of purging.

4. As hay is ſo material an article in a horſe's diet, great care ſhould be taken to procure the beſt: when it is not extraordinary, the duſt ſhould be well ſhook out before it is put in the rack; for ſuch hay is very apt to breed vermin.

5. Beans afford the ſtrongeſt nouriſhment of all grain; but are fitteſt for laborious horſes, except on particular occaſions. In ſome ſeaſons they breed a kind of vermin called the *red bugs,* which is thought to be dangerous;

Management of horſes.

gerous; the beſt method in ſuch a caſe is to procure them well dried and ſplit.

6. Bran ſcalded is a kind of panada to a ſick horſe: but nothing is worſe than a too frequent uſe of it, either dry or ſcalded; for it relaxes and weakens the bowels too much. The botts in young horſes may be owing to too much muſty bran and chaff, given with other foul food to make them up for ſale; particular care therefore ſhould be taken that the bran be always ſweet and new.

7. Oats, well ripened, make a more hearty and durable diet than barley, and are much better ſuited to the conſtitutions of Britiſh horſes. A proper quantity of cut ſtraw and hay mixed with them, is ſometimes very uſeful to horſes troubled with botts, indigeſtion, &c.

8. Horſes who eat their litter, ſhould particularly have cut ſtraw and powdered chalk given them with their feed; as it is a ſign of a depraved ſtomach, which wants correcting.

9. The ſalt-marſhes are good paſture for horſes who have been ſurfeited, and indeed for many other diſorders: they purge more by dung and urine than any other paſture, and make afterwards a firmer fleſh; their water is for the moſt part brackiſh, and of courſe, as well as the graſs, ſaturated with ſalts from the ſea-water.

10. A ſummer's graſs is often neceſſary; more particularly to horſes glutted with food, and which uſe little exerciſe: but a month or two's running is proper for moſt; thoſe eſpecially who have been worked hard, and have ſtiff limbs, ſwelled legs, or wind-galls. Horſes whoſe feet have been impaired by quittors, bad ſhoeing, or any other accidents, are alſo beſt repaired at graſs. Thoſe lameneſſes particularly require turning out to graſs, where the muſcles or tendons are contracted or ſhrunk; for by the continual gentle exerciſe in the field, with the aſſiſtance of a pattin-ſhoe on the oppoſite foot, the ſhortened limb is kept on the ſtretch, the waſted parts are reſtored to their ordinary dimenſions, and the limb again recovers its uſual tone and ſtrength.

11. The fields which lie near great towns and are much dunged, are not proper paſture for horſes; but on obſervation appear very injurious to them, if they feed thereon all the ſummer.

12. Horſes may be kept abroad all the year, where they have a proper ſtable or ſhed to ſhelter them from the weather, and hay at all times to come to. So treated, they are ſeldom ſick; their limbs are always clean and dry; and with the allowance of corn, will hunt, and do more buſineſs than horſes kept conſtantly within doors.

13. If horſes, when taken from graſs, ſhould grow hot and coſtive, mix bran and chopt hay with their corn; and give them ſometimes a feed of ſcalded bran for a fortnight, or longer: let their exerciſe and diet be moderate for ſome time, and increaſe both by degrees.

14. When horſes are ſoiled in the ſtable, care ſhould be taken that the herbage is young, tender, and full of ſap; whether it be green barley, tares, clover, or any thing elſe the ſeaſon produces; and that it be cut freſh once every day at leaſt, if not oftener.

15. When horſes loſe their fleſh much in ſoiling, they ſhould in time be taken to a more ſolid diet: for it is not in ſoiling as in grazing; where, though a horſe loſes his fleſh at firſt, yet after the graſs has purged him, he ſoon grows fat.

Blood-letting.

16. Young horſes, who have not done growing, muſt be indulged more in their feeding than thoſe come to their maturity; but if their exerciſe is ſo little as to make it neceſſary to abridge their allowance of hay, a little freſh ſtraw ſhould conſtantly be put in their racks to prevent their nibbling the manger, and turning crib-biters; they ſhould alſo be ſometimes ſtrapped back in order to cure them of this habit.

17. It is obvious to every one, what care ſhould be taken of a horſe after violent exerciſe, that he cool not too faſt, and drink no cold water, &c. for which reaſon we ſhall wave particular directions.

18. Moſt horſes fed for ſale have the interſtices of their muſcles ſo filled with fat, that their true ſhapes are hardly known. For which reaſon a horſe juſt come out of the dealer's hand ſhould at firſt be gently uſed. He ought to loſe blood, and have his diet lowered, though not too much: walking exerciſe is moſt proper at firſt, two hours in the day; in a week or fortnight two hours at a time, twice a-day; after this uſage for a month, bleed him again, and give him two or three times a-week ſcalded bran, which will prepare him for purging phyſic, that may now be given ſafely, and repeated at the uſual intervals.

19. When a horſe comes out of a dealer's hands, his cloathing muſt be abated by degrees, and care taken to put him in a moderately warm ſtable; otherwiſe the ſudden tranſition would be attended with the worſt conſequences.

SECT. II. *Of Blood-letting.*

1. HORSES who ſtand much in ſtable, and are full fed, require bleeding now and then; eſpecially when their eyes look heavy, dull, red, and inflamed; as alſo when they feel hotter than uſual, and mangle their hay.

Young horſes ſhould be bled when they are ſhedding their teeth, as it takes off thoſe feveriſh heats they are then ſubject too. But the caſes that chiefly require bleeding, are colds, fevers of moſt kinds, falls, bruiſes, hurts of the eyes, ſtrains, and all inflammatory diſorders, &c.

It is right to bleed a horſe when he begins to grow fleſhy at graſs, or at any other time when he looks heavy; and it is generally proper to bleed before purging.

Let your horſe always be bled by meaſure, that you may know what quantity you take away: two or three quarts are always enough at one time; when you repeat it, allow for the diſorder and the horſe's conſtitution.

Although the operation of blood-letting is generally thought to be pretty well known, yet there are many untoward accidents that frequently happen from the unſkilful and unexperienced in performing it. The following directions and cautions on this head are extracted from Mr *Clark's Treatiſe on the Prevention of Diſeaſes incidental to Horſes*.

As horſes are naturally timorous and fearful, which is too frequently increaſed by bad uſage and improper chaſtiſement, they require in ſome caſes, particularly in this of bleeding, to be taken unawares or by ſurpriſe, Blood-letting.

priſe, and the orifice made into the vein before their fears are alarmed. For this reaſon, the fleam and blood-ſtick, as it is called, have been long in uſe, and in ſkilful hands are not improper inſtruments for the purpoſe; although with many practitioners the ſpring-fleam would be much ſafer, and on that account ought to be preferred. When a lancet is uſed, the inſtant the horſe feels the point of it, he raiſes and ſhakes his head and neck, in order to ſhun the inſtrument before the operator has time to make a proper orifice, which frequently proves too ſmall or too large; for this reaſon, thoſe who have tried the lancet have been obliged to lay it aſide.

Many perſons tie a ligature or bandage round the neck, in order to raiſe the vein, and that they may ſtrike the fleam into it with the greater certainty; but a ſlight view of its effects in preventing this, and its other conſequences, will ſhew the impropriety of the practice.

When a ligature is tied round the neck previous to bleeding in the jugular veins, it is to be obſerved, that it ſtops the circulation in both veins at the ſame time; hence they become turgid and very full of blood, inſomuch that they feel under the finger like a tight cord; and as the parts around them are looſe and ſoft, when the ſtroke is given to the fleam, the vein by its hardneſs or tightneſs ſlips to one ſide, of courſe it eludes the ſtroke; hence a deep wound is made by the fleam to no purpoſe, and this is ſometimes too frequently repeated. Unſkilful people have likewiſe a cuſtom of waving or ſhaking the blood-ſtick before they ſtrike the fleam in view of the horſe, whoſe eye is fixed on that inſtrument; and when they intend to give the ſtroke, they make a greater exertion: hence the horſe being alarmed by its motion, raiſes his head and neck, and a diſappointment follows. The ſtruggle that enſues by this means prolongs the operation; the ligature at the ſame time being ſtill continued round the neck, a total ſtagnation of the blood in the veſſels of the head takes place; and hence it frequently happens, that the horſe falls down in an apoplectic fit. In ſuch caſes the operator being diſconcerted, generally deſiſts from any farther attempts to draw blood at that time, under the idea that the horſe was vicious and unruly, although the very treatment the horſe had juſt undergone rendered bleeding at this time the more neceſſary, in order to make a ſpeedy revulſion from the veſſels of the head. Therefore, a ligature or bandage ought never to be uſed till ſuch time as the opening is made into the vein; and even then it will not be neceſſary at all times if the horſe can ſtand on his feet, as a moderate preſſure with the finger on the vein will make the blood flow freely; but if the horſe is lying on the ground, a ligature will be neceſſary.

But farther, the concuſſion or ſhock the horſe receives from his falling down in the above ſituation, which will always happen if the ligature is too long continued, may cauſe a blood-veſſel within the head to burſt, and death may be the conſequence.

Another cuſtom equally abſurd is allowing the blood to fall in a dunghill amongſt ſtraw, in dry ſand, or in dry duſt, by which means no diſtinct idea can be formedd of the quantity that is or ought to be taken away. In ſuch caſes horſes have fallen down in a faint from the loſs of too much blood, before the operator thought of ſtopping up the orifice. For this and a variety of other reaſons which might be mentioned, a meaſure as above obſerved, ought always to be uſed, in order to aſcertain the quantity of blood that is taken away.

In pinning up the orifice, ſome have a cuſtom of raiſing or drawing out the ſkin too far from the vein; hence the blood flows from the orifice in the vein into the cellular ſubſtance between it and the ſkin, which cauſes a large lump or ſwelling to take place immediately: this frequently ends in what is called a *ſwelled neck*; a ſuppuration follows, which proves both tedious and troubleſome to cure. In caſes where a horſe may be tied up to the rack after bleeding in the neck, pinning up the external orifice may be diſpenſed with; but when a horſe is troubled with the gripes or any other acute diſeaſe, in which he lies down and tumbles about, it is neceſſary that the orifice be pinned up with care, in order to prevent the loſs of too much blood.

As the neck or jugular vein on the near ſide is commonly opened for conveniency by thoſe who are right-handed, the young practitioner ſhould learn to perform on both ſides of the neck. This he will find in practice to be not only uſeful but neceſſary, as he may frequently have occaſion to draw blood from horſes in very aukward ſituations; he will likewiſe find his account in it in a variety of caſes, which it is needleſs here to particulariſe.

The proper place for making the opening in the neck or jugular vein is likewiſe neceſſary to be attended to: for when the orifice is made too low, or about the middle of the neck, where the vein lies deep under the muſcular teguments, the wound becomes difficult to heal, and frequently ends in a ſuppuration, with a jetting out of proud fleſh from the orifice; which, unluckily, is as unſkilfully treated in the common method of cure, *viz.* by introducing a large piece of corroſive ſublimate into the wound: this not only deſtroys the proud fleſh in the lips of the wound, but a conſiderable portion of the fleſh around it; and in farriery it is called *coreing out the vein.* It frequently happens, that this corroſive application deſtroys the vein likewiſe; and ſometimes violent hemorrhagies follow, ſo as to endanger the life of the animal.

The moſt proper place for making the opening in the jugular veins is where the teguments are thinneſt, which is about a hand-breadth from the head, and about one inch below the branching or joining of the vein which comes from the lower jaw, and which may be diſtinctly ſeen when any preſſure is made on the main branch of the vein.

In performing the operation with a fleam, the operator ſhould hold the fleam between the fore-finger and thumb of the left hand; with the ſecond finger he is to make a ſlight preſſure on the vein, and before it becomes too turgid or full make the opening; the ſame degree of preſſure is to be continued on the vein, till ſuch time as the quantity of blood to be taken away is received into a proper meaſure.

Another great error, which generally prevails in opening the veins with a fleam, is the applying too great force, or giving too violent a ſtroke to it, by which it is forced through the oppoſite ſide of the vein: hence there is danger of wounding the coats of the arteries, as they generally lie under the veins; or, in ſome particular places, of wounding the tendons, eſpecially when

Blood-letting.

this operation is performed in the legs, thighs, &c. or in the veins, commonly called the *plate veins*, under the breaſt, the conſequences are frequently very troubleſome to remove, and in ſome caſes prove fatal. Mr Gibſon, in his Treatiſe on the Diſeaſes of Horſes, mentions a caſe of a fine horſe that was blooded in the plate veins for a lameneſs of the ſhoulder, which was followed with a hard oval ſwelling about the ſize of a gooſe egg, which extended upwards on the breaſt, and likewiſe down the leg, attended with exceſſive pain, fever, deadneſs in the horſe's looks, and all the other ſymptoms of a beginning mortification.

In order to avoid the conſequences ſometimes attending theſe local operations in the breaſt, legs, &c. and as horſes are more or leſs troubleſome and reſtleſs, whereby accidents of this kind may happen, it will perhaps be adviſeable, in moſt caſes of lameneſs, &c. to draw blood from the larger veins in the neck only, where there is leſs danger of accidents, more eſpecially if a ſpring fleam is uſed: for although it might be of ſome advantage in particular caſes to draw blood as near the affected part as poſſible, yet the bad conſequences frequently attending it ought to counterbalance any advantages that may be expected from it, eſpecially as the quantity of blood drawn from the ſmall veins is but inconſiderable, and of courſe no great benefit can be expected from it in horſes when they are diſeaſed.

The principal view in drawing blood is the leſſening of its quantity, by which the remaining maſs circulates with more freedom in the veſſels; it likewiſe takes off the inflammatory tendency of the blood, removes ſpaſms, &c. and prevents other bad conſequences that may follow, eſpecially in plethoric habits: and it ought always to be remembered, that when the ſigns or ſymptoms of a diſeaſe are taken from the motion of the blood, the diſorders ariſing from it depend upon its circulation being either increaſed or diminiſhed: hence, therefore, all the changes which take place in the texture, quantity, and quality of the blood, are attended with a diminution or increaſe of its velocity.

Although the caſes which may require bleeding are numerous, yet one general caution is neceſſary, namely, never to take away blood but when it is abſolutely neceſſary: for it is a fluid that may be eaſily taken away, but cannot be ſo eaſily replaced; beſides, the practice of bleeding frequently, or at ſtated times, is exceedingly improper, as it diſpoſes the body to become lax, weak, and plethoric. In bleeding, therefore, a due regard muſt always be had to the conſtitution, age, ſtrength, &c. of horſes, and the ſtate or habit of body they are in at the time.

Although we ought to be ſparing of drawing blood from horſes on trifling occaſions when they may be ſaid to be in health, yet when caſes occur that do require it, it may not only ſafely, but uſefully, be recommended to take away a greater quantity at once than is generally done; that is, from ſix to eight pounds, which will be about three or four quarts Engliſh meaſure, according to the urgency of the ſymptoms, &c. at the time, ſtrength and age of the horſe conſidered. For as horſes are very ſubject to inflammatory diſeaſes and thoſe that are of the ſpaſmodic kind, and as bleeding plentifully relaxes the whole ſyſtem in theſe caſes, the taking away a ſmall quantity of blood, about one quart or two pounds, is in fact trifling with the diſeaſe; the horſe is ſaid to have been *blooded*, and that ſatisfies his owner and the farrier; time is loſt; the diſeaſe acquires ſtrength; it will then be beyond the power of art to mitigate or to conquer it: hence the horſe falls a ſacrifice to timidity and ignorance. It is to be remembered, that inflammatory diſeaſes, particularly when the bowels are affected, make a very rapid progreſs in horſes; and if they are not overcome at the beginning by bleeding plentifully, the horſe commonly dies in 24 or 30 hours of a gangrene and mortification in the inteſtines.

Purging

Sect. III. *Of Purging.*

Purging is often neceſſary in groſs full horſes, in ſome diſorders of the ſtomach, liver, &c. but ſhould be directed with caution. Before a purge is given to any horſe, it is neceſſary ſome preparation ſhould be made for it, in order to render the operation more ſafe and efficacious: thus a horſe that is full of fleſh ſhould firſt be bled, and at the ſame time have his diet lowered for a week, eſpecially thoſe that have been pampered for ſale; ſeveral maſhes of ſcalded bran ſhould alſo previouſly be given, in order to open the bowels, and unload them of any indurated excrement, which ſometimes proves an obſtacle to the working of the phyſic, by creating great ſickneſs and griping.

Let it be remembered, that a horſe is purged with difficulty; that the phyſic generally lies 24 hours in the guts before it works; and that the tract of bowels it has to paſs through is above 30 yards, all lying horizontally: conſequently reſinous and other improper drugs may, and often do, by their violent irritation, occaſion exceſſive gripings and cold ſweats, ſhave off the very mucus or lining of the guts, and bring on inflammations, which often terminate in mortifications and death. It is remarkable too, that the ſtomach and guts of a horſe are but thin, compared to ſome other animals of the ſame bulk, and therefore muſt be more liable to inflammation and irritation.

Horſes kept much in the ſtable, who have not the proper benefit of air and exerciſe in proportion to their food, ſhould in ſpring have a mild purge or two after a previous preparation by bleeding, lowering their diet, and ſcalded maſhes.

Horſes that fall off in their ſtomach, whether it proceeds from too full feeding, or ingendering crudities and indigeſted matter, ſhould have a mild purge or two.

Horſes of a hot temperament will not bear the common aloetic purges: their phyſic therefore ſhould be mild and cooling.

Purging is always found very beneficial in ſtubborn dry coughs: but mild mercurials joined with them make them yet more efficacious.

Horſes of a watery conſtitution, who are ſubject to ſwelled legs that run a ſharp briny ichor, cannot have the cauſes removed any way ſo effectually as by purging.

The firſt purge you give to a horſe ſhould be mild, in order to know his conſtitution.

It is a miſtaken notion, that if a proper prepared purge does not work to expectation, the horſe will be injured by it; for though it does not paſs by ſtool, its operation may be more efficacious as an alterative to

Purging.

purify the blood, and it may paſs by urine or other ſecretions.

Purging medicines are very ſuccesſfully given in ſmall quantities, mixed with others; and act then as alteratives.

If mercurial phyſic is given, care ſhould be taken that it be well prepared; and warmer cloathing and greater circumſpection are then required.

Purges ſhould be given early in the morning upon an empty ſtomach: about three or four hours after the horſe has taken it, he ſhould have a feed of ſcalded bran; and a lock or two of hay may then be put into his rack. The ſame day give him two or more maſhes; but ſhould he refuſe warm meat, he may be allowed raw bran.

All his water ſhould be milk-warm, and have a handful of bran ſqueezed in it; but if he refuſes to drink white water, give it him without bran.

Early the next morning give him another maſh; but if he refuſes to eat it, give him as much warm water as he will drink: let him be properly cloathed, and rode gently about. This ſhould be done two or three times a-day, unleſs he purges violently; once or twice will then be ſufficient: at night give him a feed of oats mixed with bran.

During the working, a horſe ſhould drink plentifully; but if he will not drink warm water, he muſt be indulged with cold, rather than not drink at all.

We ſhall here inſert ſome general forms of purges.

Take ſocotorine aloes ten drams, jalap and ſalt of tartar each two drams, grated ginger one dram, oil of cloves 30 drops; make them into a ball with ſyrup of buckthorn. Or,

Take aloes and cream of tartar each one ounce, jalap two drams, cloves powdered one dram, ſyrup of buckthorn a ſufficient quantity.

Or the following, which has an eſtabliſhed character among ſportſmen:

Take aloes from ten drams to one ounce and an half, myrrh and ginger powdered each half an ounce, ſaffron and oil of aniſeed each half a dram.

Mr. Gibſon recommends the following:

Take ſocotorine aloes ten drams, myrrh finely powdered half an ounce, ſaffron and freſh jalap in powder of each a dram; make them into a ſtiff ball with ſyrup of roſes, then add a ſmall ſpoonful of rectified oil of amber.

The ſocotorine aloes ſhould always be preferred to the Barbadoes or plantation aloes, though the latter may be given to robuſt ſtrong horſes; but even then ſhould always be prepared with the ſalt or cream of tartar, which, by opening its parts, prevents its adheſion to the coats of the ſtomach and bowels; from whence horrid gripings, and even death itſelf, has often enſued. This caution is well worth remarking, as many a horſe hath fallen a ſacrifice to the neglect of it.

Half an ounce of Caſtile ſoap, to a horſe of a groſs conſtitution, may be added to any of the above; and the proportions may be increaſed for ſtrong horſes.

When mercurial phyſic is intended, give two drams of calomel over night, mixed up with half an ounce of diapente and a little honey, and the purging ball the next morning.

The following, when it can be afforded, is a very gentle and effectual purge, particularly for fine delicate horſes: and if prepared with the Indian rhubarb, will not be expenſive.

Purging.

Take of the fineſt ſocotorine aloes one ounce, rhubarb powdered half an ounce or ſix drams, ginger grated one dram; make into a ball with ſyrup of roſes.

The following purging drink may be given with the utmoſt ſafety; it may be quickened or made ſtronger, by adding an ounce more ſenna, or two drams of jalap.

Take ſenna two ounces; infuſe it in a pint of boiling water two hours, with three drams of ſalt of tartar; pour off, and diſſolve in it four ounces of Glauber's ſalts, and two or three of cream of tartar.

This laſt phyſic is cooling, eaſy, and quick in its operation; and greatly preferable in all inflammatory caſes to any other purge, as it paſſes into the blood, and operates alſo by urine.

When horſes loſe their appetite after purging, it is neceſſary to give them a warm ſtomach-drink made of an infuſion of camomile flowers, aniſeeds, and ſaffron: or the cordial-ball may be given for that purpoſe.

Should the purging continue too long, give an ounce of diaſcordium in an Engliſh pint of Port-wine; and repeat it once in 12 hours, if the purging continues. Plenty of gum-arabic water ſhould alſo be given; and in caſe of violent gripes, fat broth glyſters or tripe liquor ſhould be often thrown up, with 100 drops of laudanum in each.

The Arabic ſolution may be thus prepared.

Take of gum-arabic and tragacanth of each four ounces, juniper-berries and carraway-ſeeds of each an ounce, cloves bruiſed half an ounce; ſimmer gently in a gallon of water till the gums are diſſolved: give a quart at a time in half a pail of water; but if he will not take it freely this way, give it him often in a horn.

When a purge does not work, but makes the horſe ſwell and refuſe his food and water, which is ſometimes the effect of bad drugs or catching cold, warm diuretics are the only remedy; of which the following are recommended.

Take a pint of white wine, nitre one ounce; mix with it a dram of camphire, diſſolved in a little rectified ſpirit of wine; then add two drams of oil of juniper, and the ſame quantity of unrectified oil of amber, and four ounces of honey or ſyrup of marſhmallows.

When a horſe ſwells with much phyſic, do not ſuffer him to be rode about till he has ſome vent; but rather lead him gently in hand till ſome evacuation is obtained.

As it is obſerved, that horſes more willingly take ſweet and palatable things than thoſe that are bitter and of an ill taſte, care ſhould be taken that the latter be given in balls, and that their drinks be always contrived to be as little nauſeous as poſſible, and ſweetened either with honey or liquorice. Thoſe that are prepared with groſs powders are by no means ſo agreeable to a horſe as thoſe made by infuſion; as the former often clam the mouth, irritate the membranes about the palate and throat, and frequently occaſion the cough they are intended to prevent.

Balls ſhould be of an oval ſhape, and not exceed the ſize of a pullet's egg: when the doſe is larger, it ſhould be divided into two; and they ſhould be dipt in oil, to make them ſlip down the eaſier.

The following cathartic balls are recommended by Mr Taplin*; the ingredients of which are differently proportioned, ſo as to ſuit different circumſtances in reſpect to ſtrength, age, ſize, and conſtitution.

1. Socotorine aloes one ounce; India rhubarb two drachms; jalap and cream of tartar each one drachm; ginger (in powder) two ſcruples: eſſential oil of cloves and aniſeed each twenty drops; ſyrup of buckthorn a ſufficient quantity to form the balls.
2. Socotorine aloes ten drams; rhubarb, jalap, and ginger, each two drams; cream of tartar three drams, and ſyrup of buckthorn to make the ball.
3. Barbadoes aloes nine drams; jalap, Caſtile ſoap, and cream of tartar, of each two drams; diagrydium and ginger (in powder) each a dram; ſyrup of backthorn ſufficient to make the ball.
4. Barbadoes aloes ten drams; Caſtile ſoap and jalap (in powder) of each half an ounce; cream of tartar and ginger each two drams; oil of aniſeed forty drops; of cloves twenty drops; which form into a ball with ſyrup of roſes or buckthorn.

Sect. IV. *Of Clyſters* †.

Clysters adminiſtered to horſes, are of greater importance in relieving them from many acute complaints, than is generally imagined; and it were to be wiſhed, that, in place of the more expenſive cordial drenches, &c. which are but too frequently given in moſt of theſe caſes, a ſimple clyſter of warm water, or thin water-gruel, were ſubſtituted in their ſtead; the latter proving of great benefit, whilſt the former too frequently prove hurtful.

Clyſters ſerve not only to evacuate the contents of the inteſtines, but alſo to convey very powerful medicines into the ſyſtem, when perhaps it is not practicable to do it by the mouth: for although they are only conveyed into the larger inteſtines, and perhaps hardly penetrate into the ſmaller; ſtill they are extremely uſeful, by fomenting as it were the latter, and at the ſame time by ſoftening the hardened excrement that is accumulated in the former, and rendering it ſo ſoft as to be expelled out of the body, by which flatulencies or other offending matters that may be pent up in them are likewiſe expelled. Beſides, by their warmneſs and relaxing powers, they act as a fomentation to the bowels; hence they may be of conſiderable ſervice in removing ſpaſmodic conſtrictions in the bowels, carrying off flatulencies, and in preventing inflammation in the inteſtines, &c.; or, by conveying opiates to the parts affected, give ſpeedy relief in cholics, &c. &c.

The uſe of emollient clyſters in fevers are conſiderable. They act by revulſion, and relieve the head when too much affected. Beſides, by throwing in a quantity of diluting liquor into the inteſtines, it not only relaxes and cleanſes them, but they may be ſaid to cool the body in general; at the ſame time, a conſiderable portion of the liquid is abſorbed and conveyed into the maſs of blood, by which means it is diluted; and, in particular complaints in the bowels, clyſters give almoſt immediate relief, as the remedies, when judiciouſly preſcribed, paſs immediately to the parts affected, with little or no alteration from the powers of the body.

Nor is the uſe of clyſters confined to medicines only; food and nouriſhment may be conveyed into the ſyſtem in this way, when a horſe is unable to ſwallow any thing by the mouth. Horſes have frequently been ſupported for ſeveral days together by nouriſhing clyſters, made of thick water-gruel, during violent inflammations or tumors in the throat, till ſuch time as they have been diſcuſſed or ſuppurated.

Nor will theſe effects appear ſtrange to thoſe who have an acquaintance with the anatomical ſtructure of the body. For the ſake of thoſe who have not, it may juſt be ſufficient to obſerve, that certain veſſels called lacteals, whoſe mouths open into the inner cavity of the inteſtines, abſorb or drink up the chyle or nouriſhment that is produced from the food, and convey it into the maſs of blood. The ſame proceſs takes place when nouriſhment is conveyed into the inteſtines by the anus or fundament: only the food requires to be ſo far prepared, broken down and diluted with water, as to render it fit to be abſorbed by the veſſels mentioned above.

In adminiſtering clyſters, it ought always to be obſerved, that the contents of the clyſter be neither too hot nor too cold, as either of theſe extremes will ſurpriſe the horſe, and cauſe him to eject or throw it out before it has had time to have any effect. Previous to introducing the clyſter-pipe, the operator, after anointing his hand and arm with, oil, butter, or hog's-lard (obſerving, at the ſame time, that the nails of his fingers are ſhort), may introduce it into the rectum, and draw out the hardened dung gradually. This operation, in farriery, is termed *back-racking*; and becomes the more neceſſary, as it frequently happens that great quantities of hardened dung is, in ſome caſes, collected in the rectum, and which the horſe cannot void eaſily without aſſiſtance of this kind.

The compoſition of clyſters ſhould be extremely ſimple: on that account they will be eaſily prepared, and as eaſily adminiſtered, provided the operator is furniſhed with a ſuitable inſtrument for the purpoſe. The generality of clyſter-pipes that are uſed, are by far too ſmall and too ſhort: although it may appear a kind of paradox, yet it is a fact, that a clyſter-pipe of a larger ſize than the ordinary ones, and of a proper thickneſs, is much eaſier introduced into the anus than one that is conſiderably ſmaller. It is likewiſe obvious, that when the pipe is too ſhort, it renders clyſters of no uſe, becauſe it cannot convey the clyſters ſo far up into the inteſtines as is neceſſary for them to be retained: a ſmall ſhort pipe of ſix or eight inches long, is not capable of conveying the injection to the end of the rectum, which, in a horſe of a middling ſize, is about 16 or 18 inches long.

But farther, after the hardened dung is taken out of the rectum by the operation abovementioned, the bladder being diſtended and full of urine, it cannot exert its contracting powder immediately, ſo as to expel its contents; it therefore preſſes up the empty rectum, and forms as it were a kind of tumor in it: if the pipe is too ſhort, it cannot reach beyond this riſing in the rectum, which forms as it were a declivity back towards the anus; and hence the liquor regurgitates or flows back at the anus as ſoon as it is diſcharged from the pipe.

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* Stable Directory, p. 36.

† From Clark's Obſervations, p. 287.

The ſmallneſs of the bag or bladder, which is generally proportioned to that of the pipe, is another very material objection to theſe inſtruments, as it ſeldom contains one quart of liquid; from which circumſtance, very little benefit can be derived from the uſe of them in ſuch large inteſtines as thoſe of a horſe. Doctor Bracken, in his firſt volume, page 203. has a very judicious remark on the uſe of clyſters. He obſerves, that "the colon of a horſe ſeems to be three guts, by reaſon of the two necks of about half a yard each, is drawn up into many cells or purſes by means of two ligaments, one of which runs along the upper and the other the under ſide of it, which, with the aſſiſtance of a valve or flap at its beginning, hinder the excrements either from returning back into the ſmall guts, or falling too ſoon downwards, before the chyle or milky ſubſtance prepared from the food be ſent into its proper veſſels. And, indeed, the cæcum or blind gut, which is the firſt of the three larger guts, ſeems to be ſo contrived in the manner of a valve, to hinder the aliment and chyle from paſſing too ſoon into the colon; for, if the aliment and chyle were not in ſome meaſure hindered in their paſſage through theſe large guts, the body could not be ſufficiently ſupplied with nouriſhment. The firſt of theſe colons is about a yard and a half in length, the ſecond about a yard, and the third, or that part which joins the rectum or arſe-gut, near ſix yards in length; ſo that the colon of a horſe 14 hands high, may be ſaid to be nearly eight yards and a half long; and, from it, along the rectum or ſtraight gut to the anus, where the excrements are diſcharged, is not above half a yard; ſo that it is plain, clyſters operate moſtly in the colon; though I muſt ſay they are given in too ſmall quantities; for what ſignifies two quarts of liquor in a gut nine yards long, and four or five inches diameter, in a natural ſtate; but in the colic, it is ſo diſtended with flatulencies, that its diameter exceeds ſeven or eight inches, as I have frequently obſerved in thoſe dying of that diſtemper."

Large ſyringes are frequently uſed for the purpoſe of giving clyſters; but of all the inſtruments ever invented, they ſeem the moſt improper for horſes. The ſhortneſs and ſmallneſs of their ivory pipes, are not only a material objection againſt the uſe of them, but they are apt to tear and wound the gut; for if a horſe ſhould prove reſtleſs, either from pain, as in caſes of the gripes, or from viciouſneſs, the ſyringe and pipe being quite inflexible, in the ſtruggle to throw up the injection the gut may be wounded or hurt, by which a diſcharge of blood and other bad conſequences may follow. But although there was not the leaſt chance of their hurting the horſe or wounding the gut, yet the force with which they throw up the liquor, always cauſes a ſurpriſe, of courſe a reſiſtance, attended with a vigorous effort to throw it out; which indeed frequently happens before the pipe of the ſyringe is withdrawn, and frequently upon the operator.

The moſt proper inſtrument for the giving of clyſters, is a ſimple bag or ox-bladder, which will hold two or three quarts, tied to the end of a wooden pipe about 14 or 15 inches long, one inch and a half diameter where the bag is tied, and of a gradual taper to the extremity, where the thickneſs ſhould ſuddenly increaſe, and be rounded off at the point, and made as ſmooth as poſſible; the perforation or hole through the pipe may be made ſufficiently large, ſo as to admit the end of a common funnel, for pouring in the liquor into the bag. By the flexibility of the bladder at the end of this inſtrument, no danger can happen to the horſe; the clyſter is conveyed ſo far up into the inteſtines that it will be retained; it cauſes no ſurpriſe (providing the liquor be neither too hot nor too cold, but milk warm), as no other force is required to throw it up than the holding the bag a little higher than the level of the pipe; by which means the liquor flows gently into the gut, without any ſurpriſe to the horſe. After uſing the bag, it may be blown full of wind, a cork put into the pipe, and hung up in ſome dry place to prevent it from rotting; by which means it will laſt a conſiderable time.

Clyſters are diſtinguiſhed by different names, which denote the quality of the ingredients of which they are compoſed, as emollient, laxative, diuretic, anodyne, &c. As the more general uſe of clyſters, in the practice of farriery, would be attended with the moſt ſalutary effects, eſpecially in acute diſeaſes, where the ſpeedieſt aſſiſtance is neceſſary, we ſhall here ſubjoin ſome forms of recipes for compoſing them, together with the caſes in which they may be adminiſtered with advantage.

1. *Emollient clyſter.* Two or three quarts of thin water-gruel, ſalad oil and coarſe ſugar, of each ſix ounces. Diſſolve the ſugar in the water-gruel, then add the ſalad oil—Give it milk warm.
2. *Laxative clyſter.* Two or three quarts of thin water-gruel, Glauber's ſalts eight ounces, ſalad oil ſix ounces.

When Glauber's ſalts are not at hand, common ſalt may be uſed in its ſtead.

A great variety of recipes might be added for making clyſters, compoſed of the infuſion of different herbs, ſeeds, &c. But the above ingredients are always eaſily got; and they will be found to anſwer all the intentions required under this head, which is to ſoften the hardened excrements, to lubricate the inteſtines, and, by exciting a gentle ſtimulus, promote a free diſcharge of their contents; which, when once obtained, ſeldom fails of giving relief in inflammatory caſes, ſpaſms, &c.

3. *Purging clyſter.* Infuſe two ounces of ſenna in two quarts of boiling water; ſtrain it off; then add ſyrup of buckthorn and common oil, of each four ounces.

This clyſter will operate more briſkly than the former, and, on that account, may be preferred when an immediate or ſpeedy diſcharge is neceſſary.

4. *Anodyne clyſter.* The jelly of ſtarch, or infuſion of linſeed, one pint; liquid laudanum, one ounce or about two table ſpoonfuls.

When there is reaſon to apprehend inflammation in the bowels, opium may be given in place of laudanum, from 20 to 30 grains, in proportion to the urgency of the ſymptoms; it ought to be well triturated or rubbed

Clyſters.

bed in a mortar, with a little of the liquid, till it has thoroughly diſſolved. The ſmallneſs of the quantity of liquid here recommended, gives it the better chance of being the longer retained, as the good effects to be derived from the opium depend entirely on this circumſtance. This clyſter is proper to be given in violent gripings, attended with purging, in order to blunt the ſharpneſs of the corroding humours, and to allay the pain uſually attending in ſuch caſes. The ſtarch will in ſome meaſure ſupply the deficiency of the natural mucus, or covering of the inteſtines, which has been carried off by violent purging. It may be repeated, if the ſymptoms continue violent, only diminiſhing the quantity of laudanum or of the opium.

5. *Nouriſhing clyſter.* Thick water-gruel three quarts.

When clyſters of this kind are found neceſſary, they may be given four or five times in the day, according as circumſtances may require; they are of conſiderable ſervice in caſes where the horſe cannot eat ſufficiently to ſupport him, or ſwallow any thing, from inflammation of the throat, jaws, &c. or in convulſions, attended with a locked jaw, &c.

6. *Diuretic clyſter.* Venice turpentine two ounces; Caſtile ſoap one ounce. Diſſolve the ſoap in two quarts of warm water; then add the turpentine, after it has been well beat up with the yolks of two eggs.

This diuretic clyſter is of great uſe in the ſtrangury, and obſtructions in the urinary paſſages; and as it is immediately applied to the parts affected, it ſeldom fails of giving relief, and has a much better effect when preſcribed in this manner than when given by the mouth: by this laſt way it mixes with the whole maſs of fluids, and may loſe a conſiderable portion of its diuretic quality before it reaches the kindeys; but, by being adminiſtered in the form of a clyſter, it is readily abſorbed by the neighbouring veſſels, and promotes a free diſcharge of urine.

It would be needleſs to add more forms of clyſters, as thoſe abovementioned will anſwer moſt caſes, without any material alteration, but what may be eaſily ſupplied by the judicious practitioner.

There are a variety of caſes where clyſters may be adminiſtered with great ſucceſs, beſides thoſe already hinted at; as in inflammatory fevers, ſpaſmodic conſtrictions, and cholicky complaints in the bowels; in recent coughs, apoplexy, convulſions, paralytic complaints, or ſwelling of the belly whether from air pent up in the bowels or from hardened excrements; in caſes where horſes are troubled with worms, as the aſcarides which lodge in the lower parts of the inteſtines, or when bott-worms are obſerved ſticking in the anus, or voided with the dung: in very coſtive habits, before laxative or opening medicines are given by the mouth; in wounds, which penetrate deep into the muſcular or tendinous parts, or in the belly, &c. in inflammations of the eyes, or when the head ſeems particularly affected; in inflammatory ſwellings on any part of the body, when a horſe cannot ſwallow any food, &c. whether it proceeds from ſpaſm in the muſcles of the throat, inflammations, or ſwellings. Clyſters compoſed of mucilaginous ſubſtances, as ſtarch, lintſeed, &c. are of great benefit in violent diarrhœas or looſeneſs, whether it proceeds from a natural diſcharge, or from too ſtrong purging medicines.

It ought always to be remembered, that clyſters ſhould be repeated frequently, till ſuch time as the diſorder for which they are given is either removed or greatly abated. This injunction may be the more readily complied with, as the adminiſtering clyſters to horſes is not attended either with much trouble or diſturbance to them.

Rowels and Setons.

SECT. V. *Rowel and Setons.**

1. ROWELS for horſes, anſwer the ſame purpoſe as iſſues in the human body. The method of introducing them is by making an inciſion through the ſkin, about three-eighths of an inch long, and then ſeparating the ſkin from the fleſh with the finger, or with a blunt horn, all round the orifice, as far as the finger will eaſily reach; then introducing a piece of leather, very thin, ſhaped round, about the ſize of a crown piece, having a large round hole in the middle of it. Previous to introducing the leather, it ſhould be covered with lint or tow, and dipped into ſome digeſtive ointment; a pledget of tow, dipped in the ſame ointment, ſhould likewiſe be put into the orifice, in order to keep out the cold air: the parts around it ſoon ſwell, which is followed with a plentiful diſcharge, from the orifice, of yellow ſerum or lymph; and, in two or three days at moſt, the diſcharge turns into thick groſs white matter: the rowel is then ſaid to ſuppurate.

Theſe artificial vents act by revulſion or derivation; and hence they become of great uſe in many caſes, as they empty the ſurrounding veſſels by a regular ſlow diſcharge of their contents, and are even of great ſervice when there is a redundancy or fulneſs of humours in general, which may require a gradual diſcharge, in preference to greater evacuations by purging medicines, &c. Rowels ſhould be placed (eſpecially in ſome particular caſes) as near the affected part as poſſible; and, at all times, they ought to have a depending orifice, in order to admit of a free diſcharge of the matter that may be contained in them.

The parts where they ought to be inſerted, and where they are found to anſwer beſt, are the belly, inſide of the thighs, the breaſt, and outſide of the ſhoulders and hips; they are ſometimes, but very injudiciouſly, put in between the jaw-bones under the root of the tongue, where they never come to a proper ſuppuration, on account of the conſtant motion of the parts in eating, &c. neither do they anſwer any good purpoſe from being placed in that ſituation. In ſome diſorders it is found neceſſary to put in ſeveral of them at once, in order to make a ſudden revulſion from the parts affected: but this ſhould be determined by the horſe's age, ſtrength, and circumſtances that require them.

But though rowels are found very beneficial in ſome caſes, yet, like a number of other operations common to horſes, they ſometimes, by the improper uſe of them, become hurtful to the conſtitution; and, in ſome diſeaſes, they frequently, inſtead of ſuppurating, turn gangrenous. Thus, in violent fevers, where they are frequently very improperly applied, they never ſuppurate properly: whether this proceeds from the quickneſs of the pulſe, together with the violent rapidity with which the fluids in general are then carried through the veſſels, or from the violent agitation in which the whole ſyſtem is thrown, it is difficult to determine; but experience confirms the obſervation, when properly attended to. In ſuch caſes, the ſurrounding parts where the rowel is placed, ſeldom or never ſwell (as in the ordinary courſe, when they ſuppurate properly), but appear dry, or much in the ſame ſtate as when they were firſt put in; there is little or no diſcharge from the orifice; and the little that does come is thin, ichorous, and bloody. In ſuch caſes, they ought to be taken out immediately, and the parts well fomented with a ſtrong infuſion of camomile, or an emollient poultice applied, if it can be properly fixed, and frequently repeated; at intervals, the parts ought likewiſe to be bathed with ardent ſpirits, as that of wine, turpentine, &c. covering the parts from the external air; and provided there is no fever at the time, two or three ounces of Peruvian bark may be given through the day, either made into balls or given in a liquid; and this continued till the threatening ſymptoms are removed.

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* From the ſame.

Rowels are of great uſe in carrying off rheums or defluctions from the eyes; in great ſwellings of the glands, &c. about the throat and jaws, which threaten a ſuffocation; or when the head ſeems particularly affected, as in the vertigo or ſtaggers, apoplexy, &c. &c.; in recent lameneſs; ſwellings of the legs and heels, attended with a diſcharge of thin ichorous matter, &c.; in large and ſudden ſwellings in any part of the body; or when extravaſations of the fluids have taken place, from blows, bruiſes, &c. or when a horſe has had a ſevere fall, &c. and in a variety of other caſes, which will occur to the judicious practitioner.

2. Setons are of great uſe in carrying off matter from deep ſeated tumours or abſceſſes in different parts of the body. They ought all times to be uſed in preference to making deep inciſions into the muſcular parts, which not only disfigure horſes, but ſuch deep inciſions are very difficult to heal up in them, on account of the ſituation of ſome of theſe tumours, and the horizontal poſition of the body, which is unfavourable in many caſes for procuring a depending opening in order to carry off the matter, as in tumors on the back, withers, and upper part of the neck immediately behind the ears, which are very common. Beſides the horizontal poſition of the body, the natural reſtleſſneſs and impatience of horſes renders it impracticable to fix proper bandages on thoſe elevated parts; the ſituation of them likewiſe will not admit of proper dreſſings being fixed on them with any degree of certainty of their remaining for any length of time; by which means the openings made into ſuch tumors or abſceſſes are frequently left bare, and expoſed to the cold air, &c.: hence ſuch openings degenerate into very foul ulcers, and produce a great deal of proud fleſh, and which require to be repeatedly cut away with the knife, as the ſtrongeſt cauſtics that can be applied are not ſufficient to keep it under.

Setons are introduced by long, thin, ſharp-pointed inſtruments or needles, ſhaped like a dart at the point, and having at the other extremity an eye to receive the end of the cord, which is to be left in the tumor. The ſize of the inſtrument may be determined by that of the tumor, and the thickneſs of the cord which is to follow it, and which at all times ought to be ſmaller than the perforation made by the point of the needle. Every practitioner in farriery ſhould always have a number of theſe needles by him, of different ſizes, that is, from 6 to 14 or 15 inches long, a little bended on the flat or under ſide. The following is the method of applying them in caſes of tumors, &c. When the matter is found to fluctuate in the tumor, the needle, armed with a cord at the other end, is to be introduced at the upper part of it, and the ſharp point of the inſtrument directed to, and brought out at the under or lowermoſt part of the tumor, including the whole length of it; or, if needful, through the ſound muſcular fleſh on the under part, in order to make a depending orifice for the matter to run freely off; the cord ſhould be dipped in ſome digeſtive ointment, and then tied together at both ends with a thread, in order to prevent its ſlipping out. But if, from the length of the perforation, the cord ſhould not admit of being tied together at the ends, a ſmall button of wood, or ſome ſuch ſubſtance, may be fixed at each end; only, from this circumſtance, the cord will require, when ſhifted, occaſionally to be drawn upwards and downwards; whereas, when the ends of it are tied together, it forms a circle, and may always be ſhifted downwards to the lower orifice. When the matter in the tumor appears to be wholly diſcharged or dried up, and no thickneſs appearing but where the cord is, it may then be cut out, and the orifices ſuffered to heal up.

When the needle for introducing the ſeton is to paſs near any large blood-veſſels or nerves; in order to prevent the chance of their being wounded, it may be concealed in a canula or caſe, open at both ends; and after an opening is made at the upper part of the tumor ſufficient to admit the needle with its caſe, it may then be directed with ſafety to paſs the blood-veſſels, &c. it may then be puſhed forward through the canula and the oppoſite ſide of the tumor, and having only the common teguments to perforate, all danger will be avoided.

SECT. VI. *Of Alterative Medicines.*

By alteratives, or altering medicines, are to be underſtood ſuch as, having no immediate ſenſible operation, gradually gain upon the conſtitution, by changing the humours or juices from a ſtate of diſtemperature to health. This intention in ſome caſes may perhaps be effected by correcting the acrimony of the juices, and accelerating the blood's motion; and in others by attenuating or breaking its particles, and dividing thoſe coheſions which obſtruct the capillaries or finer veſſels, and ſo promote the due ſecretions of the various fluids. It is certain, that many have but an indifferent opinion of a medicine that does not operate externally, and gratify their ſenſes with a quantity of imagined humours ejected from the body: but let ſuch people remember, that there are good humours as well as bad which are thrown off together; that no evacuating medicine has a power of ſelecting or ſeparating the bad from the good; and conſequently that they are thrown out only in a proportionate quantity. Theſe few hints may be ſufficient to convince the judicious reader of the great advantages ariſing from alteratives, and the preference due to them in moſt caſes over purgatives; unleſs it could be proved, as already mentioned, that the latter could cull out and ſeparate from the blood the bad humours ſolely, leaving the good behind; but this

Alterative Medicines

this ſelective power has long been juſtly exploded as ridiculous and uncertain; ſince it is plain, that all kinds of purging medicines differ only in degree of ſtrength, and operate no otherwiſe upon different humours than as they ſtimulate more or leſs.

We ſhall therefore take this opportunity of recommending ſome alterative medicines which are not ſo generally known as they ought to be; and that too on the ſureſt grounds, a proper experience of their good effects in repeated trials. The firſt, then, is nitre or purified ſalt-petre; which has long been in great eſteem, and perhaps is more to be depended on in all inflammatory fevers than any other medicine whatever: but beſides this extenſive power of allaying inflammatory diſorders, it is now offered as an alterative remedy, taken in proper quantities for ſurfeits, molten greaſe, hide-bound, greaſe-heels, &c. And as it has been known to ſucceed even in the cure of the farcy; what other diſtempers in horſes, ariſing from vitiated fluids, may it not be tried on, with a ſtrong probability of ſucceſs? This great advantage will ariſe from the uſe of this medicine over moſt others, that, as its operation is chiefly by urine, it requires no confinement or cloathing; but the horſe may be worked moderately throughout the whole courſe. This medicine has been found equally efficacious (by many trials made in one of our hoſpitals) in correcting the acrimony of the juices, and diſpoſing the moſt obſtinate and inveterate ſores to heal up; and hence probably it came recommended as an alterative to our horſes.

The quantity of nitre given at a time ſhould be from two to three ounces a-day; let it be finely powdered, and then mix with it by little at a time as much honey as will form it into a ball: give it every morning faſting for a month; or it may be given at firſt for a fortnight only, intermitting a fortnight, and then repeat it. If it be obſerved that the horſe ſhows an uneaſineſs at the ſtomach after taking it, a horn or two of any liquor ſhould be given after it, or it may be diſſolved at firſt in his water, or mixed with his corn; though the ball, where it agrees, is the eaſieſt method of giving.

When horſes take drinks with great reluctance, powders muſt be given in their feeds: thus crude antimony, or liver of antimony finely powdered, may be given to the quantity of half an ounce, night and morning; but in all ſurfeits, gum guaiacum mixed with antimony is found more efficacious. Thus,

Take of crude antimony finely powdered, or, where it can be afforded, cinnabar of antimony, and gum guaiacum, of each a pound: mix together with an oily peſtle to prevent the gum's caking: divide the whole into 32 doſes, viz. an ounce each doſe: let one be given every day in the evening-feed.

Or, Take of cinnabar of antimony, gum guaiacum, and Caſtile or Venice ſoap, of each half a pound; ſalt of tartar, four ounces: beat them up into a maſs, and give an ounce every day. To theſe may be added very advantageouſly an ounce and an half of camphor.

Æthiops mineral, given to the quantity of half an ounce a-day, is a very good ſweetener and corrector of the blood and juices; but it has been obſerved, after having been taken a week or ten days, to make ſome horſes ſlabber, and unable to chew their hay and oats; and the ſame ſymptoms have ariſen, where only two drams of crude mercury has been given, and continued about the ſame ſpace of time.

Colds.

Diet-drinks—1. A decoction of logwood, prepared like that of guaiacum, is alſo ſucceſsfully given in ſurfeits.

2. Lime-water prepared with ſhavings of ſaſſafras and liquorice, is a good diet-drink to ſweeten and correct a horſe's blood; and may be given with the nitre-balls for that purpoſe.

3. Tar-water alſo, may in many caſes be well worth trial: but let it be remembered, that all medicines of this kind ſhould be continued a conſiderable time in obſtinate caſes.

Sect. VII. *Of Colds.*

By taking cold, we mean that the pores and outlets of the ſkin (which in a natural healthy ſtate of body are continually breathing out a fine fluid, like the ſteam ariſing from hot water, or ſmoke from fire) are ſo far ſhut up, that theſe ſteams, or perſpirable matter, not having a free paſſage through them, are hindered from going off in the uſual manner; the conſequence of which is, their recoiling on the blood, vitiating its quality, overfilling the veſſels, and affecting the head, glands or kernels of the neck and throat, the lungs, and other principal parts.

To enumerate the various cauſes of colds would be endleſs: the moſt uſual are, riding horſes till they are hot, and ſuffering them to ſtand in that condition where the air is cold and piercing; removing a horſe from a hot ſtable to a cold one, and too ſuddenly changing his cloathing; whence it is that horſes often catch ſuch ſevere colds after they come out of dealers hands, and by not being carefully rubbed down when they come in hot off journies.

Where there is a conſtant attention and care, the effects of cold are not only ſoon diſcovered, but an obſervation may be very early made to what part it more immediately directs its attack. For inſtance, if the nervous ſyſtem be the moſt irritable, the affection is quickly perceived in the eyes; if the glandular, upon the neck, throat, under the ears, or in the head: or if more particularly the ſyſtem of circulation has been affected, the conſequences are ſoon apparent upon the lungs: and will be exerted more or leſs in a cough, or difficulty of breathing, according to the ſeverity of attack, from the repulſion of perſpirable matter, and its conſequent abſorption into the circulation. As ſoon as the horſe is in this ſtate, a ſymptomatic fever attends; which is to be underſtood as no more than a degree of febrile heat or irritability dependant on the original cauſe, which gradually ceaſes as the primary diſeaſe is found to decline.

From an affection of the different parts above ſpecified, various diſorders enſue, which are treated of under their proper heads. Here we have only to conſider that kind of cold fixed on the lungs, which produces cough; and which, if taken in its firſt ſtage, generally yields to very ſimple remedies.

As ſoon as the attack has been obſerved, bleeding ſhould be inſtantly performed, according to ſymptoms, ſize, ſtate, and condition; and the blood preſerved a few hours to aſcertain its ſtate: if livid or black, with a coat of ſize upon its ſurface, there is no doubt of its viſcidity, and of the obſtructed circulation of that fluid through the finer veſſels of the lungs. In three or four hours after bleeding, give a maſh prepared as follows :

Take of bran and oats, equal parts. Pour on boiling water a ſufficient quantity : then ſtir in aniſeed and liquorice powders, each one ounce ; honey, four ounces. In two hours after the maſh give a gallon or ſix quarts of ſoft water moderately warm, in which has been diſſolved two ounces of nitre.

Theſe maſhes Mr Taplin directs to be “ continued every night and morning, giving a moderate feed of dry oats in the middle of the day, good ſweet hay in ſmall quantities, and the ſame proportion of nitre to be repeated in the water after each maſh. To theſe muſt be added the neceſſary regulations of good dreſſing and gentle exerciſe, which in general ſoon effect the cure of ſuch colds as are counteracted upon the firſt attack.”

To humour thoſe who are not ſatisfied without ſome formal compoſitions, the following may be exhibited when the fever does not run high.

Pectoral Horſe-ball. Take of the freſh powders of aniſeed, elecampane, carraway, liquorice, turmerick, and flour of brimſtone, each three ounces ; juice of liquorice four ounces, diſſolved in a ſufficient quantity of mountain ; ſaffron powdered half an ounce, ſalad-oil and honey half a pound, oil of aniſeed one ounce : mix them together with wheat-flour enough to make them into a paſte.

Or the following from Dr Bracken.

Take aniſeed, carraway ſeed, and greater cardamoms, finely powdered, of each one ounce, flour of brimſtone two ounces, turmerick in fine powder one ounce and a half, ſaffron two grains, Spaniſh juice diſſolved in water two ounces, oil of aniſeed half an ounce, liquorice powder one ounce and a half, wheat-flower a ſufficient quantity to make into a ſtiff paſte by beating all the ingredients well in a mortar.

Theſe balls conſiſt of warm opening ingredients : and, given in ſmall quantities, about the ſize of a pullet's egg, will encourage a free perſpiration.

To a horſe loaded with fleſh, a rowel may ſometimes be neceſſary, as may alſo a gentle purge or two to ſome when the diſtemper is gone off.

When the diſorder has been neglected, and made a rapid progreſs, ſhould the cough be violent and conſtant, the horſe very dull and refuſing his food, and the ſymptomatic fever run high, the blood will conſequently prove as before deſcribed. In this caſe the ſymptoms will not perhaps yield to the above plan ſo ſoon as may be wiſhed. It will therefore be neceſſary to repeat the bleeding in two or three days at fartheſt, according to circumſtances. The maſhes may at the ſame time be altered to equal parts of malt and bran, ſcalded with boiling water ; into which, when nearly cool, enough for the manger, ſtir elecampane, aniſeed and liquorice powders, each one ounce : this maſh to be repeated every night and morning : continuing alſo the noon-feed dry, and the nitre two ounces in the water, as before directed. By a due attention to theſe meaſures, relief will ſoon be obtained, and a cure generally effected in the courſe of a few days : Whereas, by delay or neglect, a confirmed cough, aſthma, broken-wind, or conſumption, may be the conſequence.

Sect. VIII. *Of Fevers in general.*

1. The ſymptoms of a fever are, Great reſtleſsneſs ; the horſe ranging from one end of his rack to the other ; his flanks beat ; his eyes are red and inflamed ; his tongue parched and dry ; his breath is hot, and ſmells ſtrong ; he loſes his appetite, and nibbles his hay, but does not chew it, and is frequently ſmelling to the ground ; the whole body is hotter than ordinary (though not parched, as in ſome inflammatory diſorders) ; he dungs often, little at a time, uſually hard, and in ſmall bits ; he ſometimes ſtales with difficulty, and his urine is high-coloured ; and he ſeems to thirſt, but drinks little at a time and often ; his pulſe beats full and hard, to 50 ſtrokes and upwards in a minute.

The firſt intention of cure is bleeding, to the quantity of two or three quarts, if the horſe is ſtrong and in good condition : then give him a pint of the following drink, four times a-day ; or an ounce of nitre, mixed up into a ball with honey, may be given thrice a-day inſtead of the drink, and waſhed down with three or four horns of any ſmall liquor.

Take of baum, ſage, and camomile-flowers, each a handful, liquorice-root ſliced half an ounce, ſalt prunel or nitre three ounces ; infuſe in two quarts of boiling water ; when cold, ſtrain off, and ſqueeze into it the juice of two or three lemons, and ſweeten with honey.

As the chief ingredient to be depended on in this drink is the nitre, it may perhaps be as well given in water alone ; but as a horſe's ſtomach is ſoon palled, and he requires palatable medicines, the other ingredients may in that reſpect have their uſe. Soleyſel for this purpoſe adviſes two ounces of ſalt of tartar, and one of ſal ammoniac, to be diſſolved in two quarts of water, and mixed with a pail of common water, adding a handful of bran or barley-flour to qualify the unpleaſant taſte : this may be given every day, and is a uſeful medicine.

His diet ſhould be ſcalded bran, given in ſmall quantities ; which if he refuſes, let him have dry bran ſprinkled with water : put a handful of pickled hay into the rack, which a horſe will often eat when he will touch nothing elſe ; his water need not be much warmed, but ſhould be given often and in ſmall quantities : his cloathing ſhould be moderate ; too much heat and weight on a horſe being improper in a fever, which ſcarce ever goes off in critical ſweats (as thoſe in the human body terminate), but by ſtrong perſpiration.

If in a day or two he begins to eat his bran and pick a little hay, this method with good nurſing will anſwer ; but if he refuſes to feed, more blood ſhould be taken away, and the drinks continued ; to which may be added two or three drams of ſaffron, avoiding at this time all hotter medicines : the following glyſter ſhould be given, which may be repeated every day, eſpecially if his dung is knotty or dry.

Take two handfuls of marſhmallows, and one of camomile flowers ; fennel-ſeed an ounce ; boil in three quarts of water to two ; ſtrain off, and add

Fevers in general.

four ounces of treacle, and a pint of linſeed oil or any common oil.

Two quarts of water-gruel, fat broth, or pot-liquor, with the treacle and oil, will anſwer this purpoſe; to which may be added a handful of ſalt. Theſe ſorts of glyſters are more proper than thoſe with purging ingredients.

The following opening drink is very effectual in thoſe fevers; and may be given every other day, when the glyſters ſhould be omitted; but the nitre-balls or drink may be continued, except on thoſe days theſe are taken.

> Take of cream of tartar and Glauber's ſalts, each four ounces; diſſolve in barley-water, or any other liquor: an ounce or two of lenitive electuary may be added, or a dram or two of powder of jalap, to quicken the operation in ſome horſes.

Four ounces of Glauber's ſalts, or cream of tartar, with the ſame quantity of lenitive electuary, may be given for the ſame purpoſe, if the former ſhould not open the body ſufficiently.

In four or five days the horſe generally begins to pick his hay, and has a ſeeming reliſh for food; tho' his flanks will heave pretty much for a fortnight: yet the temper of his body and return of appetite ſhow, that nothing more is requiſite to complete his recovery than walking him abroad in the air, and allowing plenty of clean litter to reſt him in the ſtable.

This method of treating a fever is ſimple, according to the laws of nature; and is confirmed by long experience to be infinitely preferable to the hot method.

The intention here is to leſſen the quantity of blood, promote the ſecretion of urine and perſpiration, and cool and dilute the fluids in general.

2. There is another ſort of fever that horſes are ſubject to, of a more complicated and irregular nature than the former; which, if not properly treated, often proves fatal.

The ſigns are, A ſlow fever, with languiſhing, and great depreſſions: the horſe is ſometimes inwardly hot, and outwardly cold; at other times hot all over, but not to any extreme; his eyes look moiſt and languid: he has a continual moiſture in his mouth, which is the reaſon he ſeldom cares to drink, and when he does, it is but little at a time. He feeds but little, and leaves off as ſoon as he has eat a mouthful or two; he moves his jaws in a feeble looſe manner, with an unpleaſant grating of his teeth; his body is commonly open; his dung ſoft and moiſt, but ſeldom greaſy; his ſtaling is often irregular, ſometimes little, at other times profuſe, ſeldom high-coloured, but rather pale, with little or no ſediment.

When a horſe's appetite declines daily, till he refuſes all meat, it is a bad ſign. When the fever doth not diminiſh, or keep at a ſtand, but increaſes, the caſe is then dangerous. But when it ſenſibly abates, and his mouth grows drier, the grating of his teeth ceaſes, his appetite mends, and he takes to lie down (which perhaps he has not done for a fortnight), theſe are promiſing ſigns. A horſe in theſe fevers always runs at the noſe, but not the kindly white diſcharge, as in the breaking of a cold, but of a reddiſh or greeniſh duſky colour, and of a conſiſtence like glue, and ſticks like turpentine to the hair on the inſide of the noſtrils: If this turns to a gleet of clear thin water, the horſe's hide keeps open, and he mends in his appetite; theſe are certain ſigns of recovery.

Fevers in general.

The various and irregular ſymptoms that attend this ſlow fever, require great ſkill to direct the cure, and more knowledge of the ſymptoms of horſes diſeaſes than the generality of gentlemen are acquainted with. The experienced farrier ſhould therefore be conſulted and attended to, in regard to the ſymptoms; but very ſeldom as to the application of the remedy, which is generally above their comprehenſion; though it may be readily ſelected, by duly attending to the obſervations here inculcated.

Firſt, then, a moderate quantity of blood, not exceeding three pints, may be taken away, and repeated in proportion to his ſtrength, fullneſs, inward ſoreneſs, cough, or any tendency to inflammation. After this, the fever-drink firſt abovementioned may be given, with the addition of an ounce of ſnake-root, and three drams of ſaffron and camphor diſſolved firſt in a little ſpirit of wine; the quantity of the nitre may be leſſened, and theſe increaſed as the ſymptoms indicate.

The diet ſhould be regular; no oats given, but ſcalded or raw bran ſprinkled; the beſt flavoured hay ſhould be given by handfuls, and often by hand, as the horſe ſometimes cannot lift up his head to the rack.

As drinking is ſo abſolutely neceſſary to dilute the blood, if the horſe refuſes to drink freely of warm water or gruel, he muſt be indulged with having the chill only taken off by ſtanding in the ſtable: nor will any inconvenience enſue, but oftener an advantage; for the nauſeous warmth of water, forced on horſes for a time, palls their ſtomachs, and takes away their appetites, which the cold water generally reſtores.

Should the fever after this treatment increaſe, the horſe feed little, ſtale often, his urine being thin and pale, and his dung ſometimes looſe, and at other times hard; ſhould the moiſture in his mouth continue, his ſkin being ſometimes dry and at others moiſt, with his coat looking ſtarting and ſurfeited: upon theſe irregular ſymptoms, which denote great danger, give the following balls, or drink; for in theſe caſes there is no time to be loſt.

> Take of contrayerva-root, myrrh, and ſnake-root, powdered, each two drams; ſaffron one dram, mithridate or Venice treacle half an ounce; make into a ball with honey, which ſhould be given twice or thrice a-day, with two or three horns of an infuſion of ſnake-root ſweetened with honey; to a pint and a half of which may be added half a pint of treacle-water or vinegar, which latter is a medicine of excellent uſe in all kinds of inflammatory and putrid diſorders, either external or internal.

Should theſe balls not prove ſucceſsful, add to each a dram of camphor, and, where it can be afforded, to a horſe of value, the ſame quantity of caſtor. Or the following drink may be ſubſtituted in their ſtead for ſome days.

> Take contrayerva and ſnake-root of each two ounces, liquorice-root one ounce, ſaffron two drams; infuſe in two quarts of boiling water cloſe covered for two hours; ſtrain off, an add half a pint of diſtilled vinegar, four ounces of ſpirit of wine, wherein half an ounce of camphor is diſſolved, and two ounces of mithridate or venice treacle;

treacle ; give a pint of this drink every four, ſix, or eight hours.

Should the horſe be coſtive, recourſe muſt be had to glyſters, or the opening drink : ſhould he purge, take care not to ſuppreſs it, if moderate ; but if, by continuance, the horſe grows feeble, add diaſcordium to his drinks, inſtead of the mithridate ; if it increaſes, give more potent remedies.

Let it be remembered, that camphor is a very powerful and effectual medicine in theſe kinds of putrid fevers ; being both active and attenuating, and particularly calculated to promote the ſecretions of urine and perſpiration.

Regard ſhould alſo be had to his ſtaling ; which if in too great quantities, ſo as manifeſtly to depreſs his ſpirits, ſhould be controlled by proper reſtrigents, or by preparing his drinks with lime-water. If, on the contrary, it happens that he is too remiſs this way, and ſtales ſo little as to occaſion a fulneſs and ſwelling of the body and legs, recourſe may be had to the following drink :

TAKE of ſalt prunella, or nitre, one ounce ; juniper-berries, and Venice turpentine, of each half an ounce : make into a ball with oil of amber.

Give him two or three of theſe balls, at proper intervals, with a decoction of marſh-mallows ſweetened with honey.

But if, notwithſtanding the method we have laid down a greeniſh or reddiſh gleet is diſcharged from his noſtrils, with a frequent ſneezing ; if he continues to loſe his fleſh, and becomes hide-bound ; if he altogether forſakes his meat, and daily grows weaker ; if he ſwells about the joints, and his eyes looked fixed and dead ; if the kernels under his jaws ſwell, and feel looſe : if his tail is raiſed, and quivers ; if his breath ſmells ſtrong, and a purging enſues with a diſcharge of fetid dark-coloured matter ; his caſe may then be looked on as deſperate, and all future attempts to ſave him will be fruitleſs.

The ſigns of a horſe's recovery are known by his hide keeping open, and his ſkin feeling kindly ; his ears and feet will be of a moderate warmth, and his eyes briſk and lively ; his noſe grows clean and dry ; his appetite mends, he lies down well, and both ſtales and dungs regularly.

Be careful not to overfeed him on his recovery : let his diet be light, feeds ſmall, and increaſed by degrees as he gets ſtrength ; for, by overfeeding, horſes have frequent relapſes or great ſurfeits, which are always difficult of cure.

If this fever ſhould be brought to intermit, or prove of the intermitting kind, immediately after the fit is over give an ounce of Jeſuit's bark, and repeat it every ſix hours till the horſe has taken four or ſix ounces : ſhould eruptions or ſwellings appear, they ought to be encouraged ; for they are good ſymptoms at the decline of a fever, denote a termination of the diſtemper, and that no further medicines are wanted.

The true reaſons, perhaps, why ſo many horſes miſcarry in fevers, are, that their maſters, or doctors, will not wait with patience, and let nature have fair play ; that they generally neglect bleeding ſufficiently at firſt ; and are conſtantly forcing down ſugar-ſops, or other food, in a horn, as if a horſe muſt be ſtarved in a few days if he did not eat : then they ply him twice or thrice a-day with hot medicines and ſpirituous drinks, which (excepting a very few caſes) muſt be extremely pernicious to a horſe, whoſe diet is naturally ſimple, and whoſe ſtomach and blood, unaccuſtomed to ſuch heating medicines, muſt be greatly injured, and without doubt are often inflamed by ſuch treatment.

Dilute the blood with plenty of water, or white drink : let his diet be warm bran-maſhes, and his hay ſprinkled. Should the fever riſe, which will be known by the ſymptoms above deſcribed, give him an ounce of nitre thrice a-day in his water, or made up in a ball with honey. Let his body be kept cool and open, with the opening drink, given twice or thrice a-week ; or an ounce of ſalt of tartar may be given every day, diſſolved in his water, for that purpoſe, omitting then the nitre. After a week's treatment in this manner, the cordial ball may be given once or twice a-day, with an infuſion of liquorice-root ſweetened with honey ; to which may be added, when the phlegm is tough, or cough dry and huſky, a quarter of a pint of linſeed or ſallad oil, and the ſame quantity of oxymel ſquills.

This following cooling purge is very proper to give at the decline of the diſtemper, and may be repeated three or four times.

TAKE two ounces of ſenna, aniſeed and fennel bruiſed each half an ounce ; ſalt of tartar three drams ; let them infuſe two hours in a pint of boiling water ; ſtrain off, and diſſolve in it three ounces of Glauber's ſalt, and two of cream of tartar ; give for a doſe in the morning.

The purge generally works before night very gently ; and in fevers, and all inflammatory diſorders, is infinitely preferable to any other phyſic.

Before we cloſe this ſection on fevers, it may be no improper hint to the curious, to take notice, that a horſe's pulſe ſhould more particularly be attended to than is cuſtomary, as a proper eſtimate may thereby be made both of the degree and violence of the fever preſent, by obſerving the rapidity of the blood's motion, and the force that the heart and arteries labour with to propel it round. The higheſt calculation that has been made of the quickneſs of the pulſe in a healthy horſe, is, that it beats about 40 ſtrokes in a minute ; ſo that in proportion to the increaſe above this number, the fever is riſing, and if farther increaſed to above 50 the fever is very high.

How often the pulſe beats in a minute may eaſily be diſcovered by meaſuring the time with a ſtop-watch or minute ſand-glaſs, while your hand is laid on the horſe's near ſide, or your fingers on any artery thoſe which run up on each ſide the neck are generally to be ſeen beating, as well as felt a little above the cheſt ; and one withinſide each leg may be traced with the finger.

A due attention to the pulſe is ſo important an article, in order to form a proper judgment in fevers, that it would appear amazing it has ſo much been neglected, if one did not recollect, that the generality of farriers are ſo egregiouſly ignorant, that they have no manner of conception of the blood's circulation, nor in general have they ability enough to diſtinguiſh the difference between an artery and a vein.—With ſuch pretty guardians do we intruſt the healths and lives of the moſt valuable of animals !

Pleuriſy, Inflammation of the Lungs, &c.

SECT. IX. *Of a Pleuriſy, and an Inflammation of the Lungs, &c.*

1. THESE diſorders have ſcarce been mentioned by any writer on farriery before Mr Gibſon; who, by frequently examining the carcaſes of dead horſes, found them ſubject to the different kinds of inflammations here deſcribed.

In order to diſtinguiſh theſe diſorders from others, we ſhall deſcribe the ſymptoms in Mr Gibſon's own words.

“A pleuriſy, then, which is an inflammation of the pleura; and a peripneumony, which is an inflammation of the lungs; have ſymptoms very much alike; with this difference only, that in a pleuriſy a horſe ſhows great uneaſineſs, and ſhifts about from place to place; the fever, which at firſt is moderate, riſes ſuddenly very high; in the beginning he often ſtrives to lie down, but ſtarts up again immediately, and frequently turns his head towards the affected ſide, which has cauſed many to miſtake a pleuritic diſorder for the gripes, this ſign being common to both, though with this difference: in the gripes, a horſe frequently lies down and rolls; and, when they are violent, he will alſo have convulſive twitches, his eyes being turned up, and his limbs ſtretched out, as if he were dying; his ears and feet are ſometimes occaſionally hot, and ſometimes as cold as ice; he falls into profuſe ſweats, and then into cold damps; ſtrives often to ſtale and dung, but with great pain and difficulty; which ſymptoms generally continue till he has ſome relief: but, in a pleuriſy, a horſe's ears and feet are always burning hot, his mouth parched and dry, his pulſe hard and quick: even ſometimes, when he is nigh dying, his fever is continued and increaſing; and though in the beginning he makes many motions to lie down, yet afterwards he reins back as far as his collar will permit, and makes not the leaſt offer to change his poſture, but ſtands panting with ſhort ſtops, and a diſpoſition to cough, till he has ſome relief, or drops down.

“In an inflammation of the lungs, ſeveral of the ſymptoms are the ſame; only in the beginning he is leſs active, and never offers to lie down during the whole time of his ſickneſs; his fever is ſtrong, breathing difficult, and attended with a ſhort cough: and whereas, in a pleuriſy, a horſe's mouth is generally parched and dry; in an inflammation of the lungs, when a horſe's mouth is open, a ropy ſlime will run out in abundance; he gleets alſo at the noſe a reddiſh or yellowiſh water, which ſticks like glue to the inſide of his noſtrils.

“In a pleuriſy, a horſe heaves and works violently at his flanks, with great reſtleſſneſs, and for the moſt part his belly is tucked up: but in an inflammation of the lungs, he always ſhows fulneſs; the working of his flanks is regular, except after drinking and ſhifting his poſture; and his ears and feet are for the moſt part cold, and often in damp ſweats.”

2. The cure of both theſe diſorders is the ſame. In the beginning a ſtrong horſe may loſe three quarts of blood, the next day two quarts more; and, if ſymptoms do not abate, the bleedings muſt be repeated, a quart at a time; for it is ſpeedy, large, and quick-repeated bleedings that are in theſe caſes chiefly to be depended on. But if a horſe has had any previous weakneſs, or is old, you muſt bleed him in leſs quantities, and oftener. Mr Gibſon recommends rowels on each ſide the breaſt, and one on the belly; and a bliſtering oitment to be rubbed all over his briſket upon the foremoſt ribs.

Pleuriſy, Inflammation of the Lungs, &c.

The diet and medicines ſhould be both cooling, attenuating, relaxing, and diluting. After the operation of bleeding, therefore, Mr Taplin * directs “to have ready ſome bran and very ſweet hay cut ſmall, and ſcalded together; which place hot in the manger, that the fumes may be imbibed as an internal fomentation to relax the rigidity of the glands, and excite a diſcharge from the noſtrils ſo ſoon as poſſible. The very nature of this caſe, and the danger to which the horſe is expoſed, ſufficiently point out the propriety and conſiſtency of exerting all poſſible alacrity to obtain relief, or counteract the diſeaſe in its firſt ſtage: therefore let the fumigation of ſcalded bran and hay be repeated every four or five hours, and the following decoction prepared without delay:

> “PEARL barley, raiſins ſplit, and Turkey figs ſliced, each ſix ounces; ſtick liquorice bruiſed, two ounces. Boil theſe in a gallon of water till reduced to three quarts; ſtrain off; and, while hot, ſtir in one pound of honey, and, when cold, a pint of diſtilled vinegar; giving an ounce of nitre in a pint of this decoction every four, five, or ſix hours, according to the ſtate and inveteracy of the diſeaſe.

“If relief is not obtained ſo ſoon as expected, and the horſe is coſtive, give a glyſter, with

> “Two quarts of common gruel; coarſe ſugar ſix ounces: Glauber ſalts four ounces; tincture of jalap two ounces; and a quarter of a pint of olive oil. This muſt be repeated every 24 hours, or oftener, if neceſſary.

“Should the ſymtoms ſtill continue violent, without diſcovering any ſigns of abatement; after waiting a proper time for the effect of previous adminiſtrations, let the bleeding be repeated, in quantity proportioned to the urgency of ſymptoms, continuing the decoction and nitre every three or four hours, and repeating the glyſter if plentiful evacuations have not been obtained by the former injection.

“The diluting drink, before preſcribed, is introduced here in preference to a ball, that its medicinal efficacy may be expeditiouſly conveyed to the ſeat of diſeaſe. So ſoon as the wiſhed-for advantages are obſerved, and the predominant and dangerous ſymptoms begin to ſubſide, when he labours leſs in reſpiration, is briſker in appearance, heaves leſs in the flank, dungs frequently, ſtales freely, runs at the noſe, eats his warm maſhes of ſcalded bran, with four ounces of honey to each, and will drink thin gruel for his common drink (in each draught of which ſhould be diſſolved two ounces of cream of tartar); in ſhort, ſo ſoon as every appearance of danger is diſpelled, the management may be the ſame as in a common cold; giving one of the following balls every morning for a fortnight, leaving off the maſhes and diluting drink by degrees, and varying the mode of treatment as circumſtances may dictate.

> “CASTILE ſoap, ſix ounces; gum ammoniacum, two ounces; aniſe and cummin ſeeds (in powder), each four ounces; honey ſufficient to form the maſs, which divide into a dozen balls.

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* Gentleman's Stable Directory, p. 215.

“ To prevent any ill effects that may ariſe from the bad condition of the matter that has ſo long overloaded the veſſels of the lungs, ſuch as the formation of ulcers, knots, or tubercles, the beſt method will be, ſo ſoon as the horſe (with great care, gentle exerciſe, moderate and regular feeding) has recovered in a tolerable degree his natural ſtrength, to put him upon the following gentle courſe of phyſic ; and it will become more immediately neceſſary, where the horſe bears about him remnants of the diſtemper, either in a gleet from the noſe, rattling in his throat, difficulty of breathing, or heaving in the flanks.

> “ Socotorine aloes nine drams ; rhubarb and jalap each a dram and a half ; gum ammoniacum, calomel, and ginger, each a dram ; oil of juniper ſixty drops ; ſyrup of buckthorn ſufficient to make a ball.

“ Six clear days or more, if the horſe is weak, ſhould be allowed between each doſe.”

There is alſo an external pleuriſy, or inflammation of the muſcles between the ribs, which, when not properly treated, proves the foundation of that diſorder called the *cheſt-founder ;* for if the inflammation is not diſperſed in time, and the viſcid blood and juices ſo attenuated by internal medicines that a free circulation is obtained, ſuch a ſtiffneſs and inactivity will remain on theſe parts, as will not eaſily be removed, and which is generally known by the name of *cheſt-founder.*

The ſigns of this inflammation, or external pleuriſy, are a ſtiffneſs of the body, ſhoulders, and fore-legs ; attended ſometimes with a ſhort dry cough, and a ſhrinking when handled in thoſe parts.

Bleeding, ſoft pectorals, attenuants, and gentle purges, are the internal remedies ; and, externally, the parts affected may be bathed with equal parts of ſpirit of ſal ammoniac and ointment of marſhmallows or oil of camomile.

Theſe outward inflammations frequently fall into the inſide of the fore-leg, and ſometimes near the ſhoulder ; forming abſceſſes, which terminate the diſorder.

Sect. X. *Of a Cough, and Aſthma.*

The conſequences of colds neglected or injudiciouſly treated, are ſettled habitual coughs, aſthmas, broken-wind, and conſumption.

Of coughs two are chiefly diſtinguiſhed. The one is looſe, almoſt continual, and increaſing to violence upon the leaſt motion : the other is a ſhort dry cough, preceded by a huſky hollow kind of wheezing, as if reſpiration was obſtructed by fragments of hay or corn retained in the paſſage. This laſt is the kind of cough called *aſthma* by moſt writers, and for which mercurial purges have been recommended. Theſe, however, Mr Taplin obſerves, may perhaps be exhibited with more propriety after the adminiſtration of a courſe of the following balls, ſhould they fail in the deſired effect. Bleeding muſt be firſt performed, and occaſionally repeated in ſmall quantities, till the glandular inflammation and irritability are allayed, and the blood ſo attenuated by the conſtant uſe of nitre, as to render the circulation free through the finer veſſels of the lungs, from the obſtructions in which all the difficulties proceed. Bleeding having taken place with the

neceſſary circumſpection as to quantity, let the two ounces of nitre be given punctually every night and morning in the water, as particularized under the article *Colds*, continuing one of the following balls every morning for a fortnight or three weeks, that a fair and deciſive trial may be obtained.

> *Detergent Pectoral Balls*—Take of Caſtile ſoap, aniſeed, and liquorice powders, each five ounces ; Barbadoes tar, ſix ounces ; gum ammoniacum, three ounces ; balſam of Tolu, one ounce ; honey (if required) to make a maſs ; which divide into a dozen balls.

If there ſhould appear no abatement of the ſymptoms after the above trial, bleeding muſt be repeated, and mercurials had recourſe to. Mr Taplin adviſes “ two doſes of mercurial phyſic to be given eight days apart, and prepared by the addition of a dram and a half of calomel to either of the purging balls (under the articles of purging) beſt calculated for the horſe's ſtrength and condition. After which repeat the above pectoral balls, with the addition of gum myrrh, Benjamin and Venice turpentine, each two ounces ; dividing the maſs into balls of two ounces each, repeating them every morning till the above proportion (with theſe additions) are totally conſumed.”

The other kind, or that long loud hollow cough which is almoſt inceſſant, and continually increaſing upon the leaſt hurry in exerciſe, proceeds equally from irritability and the action of the ſlimy mucus upon the glands in reſpiration, as well as the viſcidity and ſluggiſh motion of the blood through the finer paſſages ; but yields to remedies with much leſs difficulty than the aſthmatic. In this caſe, as in the other, bleeding muſt be premiſed, and followed by a maſh compounded of equal parts of bran and oats, into which muſt be ſtirred and diſſolved, while hot, honey four ounces. This maſh muſt be repeated, with two ounces of nitre in the water, without intermiſſion, every night and morning ; giving alſo every morning the following ball, being an improvement by Mr. Taplin upon the *cordial ball* of Braken.

> Take Turkey figs, Spaniſh liquorice, aniſeed, and liquorice powders, each four ounces ; carraway ſeeds, elecampane, and aniſated balſam, each two ounces ; ſaffron, ginger (in powder), and oil of aniſeed, each ſix drachms ; honey ſufficient to form the maſs ; and divide into twelve balls ; of which let one be given every morning.

The figs and ſaffron are to be beat to a paſte in the mortar previous to their incorporation with the other articles, the Spaniſh liquorice is to be ſoftened over the fire by boiling in a ſmall quantity of ſpring-water, and the whole of the ingredients mixed in a proper manner. “ Theſe balls (ſays our author) are powerfully cordial and reſtorative ; they promote glandular excretion, warm and ſtimulate the ſtomach to the expulſion of wind, enliven the circulation, and invigorate the whole frame, as has been ſufficiently aſcertained by their inſtantaneous effect in the chaſe, where their excellence has been repeatedly eſtabliſhed ; but more particular in deep ſwampy countries, when, after a ſevere burſt, or a repetition of ſtrong leaps, the horſe has been ſo off his wind, or in fact, nature ſo exhauſted, as not to be able to proceed a ſtroke farther ; the immediate adminiſtration of a ſingle ball has not only afforded in-

Broken Wind.

ſtant relief, but the horſe gone through the day with his uſual alacrity."

Before cloſing this ſection, it may be neceſſary to obſerve, that young horſes are ſubject to coughs on cutting their teeth; their eyes alſo are affected from the ſame cough. In theſe caſes always bleed; and if the cough is obſtinate, repeat it, and give warm maſhes; which, in general, are alone ſufficient to remove this complaint.

SECT. XI. *Of a Broken Wind.*

THIS diſorder, Mr Gibſon is inclined to think, frequently originates from injudicious or haſty feeding of young horſes for ſale; by which means the growth of the lungs, and all the contents within the cheſt, are ſo increaſed, and in a few years ſo preternaturally enlarged, that the cavity of the cheſt is not capacious enough for them to expand themſelves in and perform their functions.

A narrow contracted cheſt with large lungs may ſometimes naturally be the cauſe of this diſorder: and it has been obſerved, that horſes riſing eight years old are as liable to this diſtemper, as, at a certain period of life, men are to fall into aſthmas, conſumptions, and chronic diſeaſes.

The reaſon why it becomes more apparent at this age, may be, that a horſe comes to his full ſtrength and maturity at this time; at ſix, he commonly finiſhes his growth in height; after that time he lets down ~~his~~ belly and ſpreads, and all his parts are grown to their full extent; ſo that the preſſure on the lungs and midriff is now more increaſed.

But how little weight ſoever theſe reaſons may have, repeated diſſections have given ocular proofs of a preternatural largeneſs, not only of the lungs of broken-winded horſes, but of their heart and its bag, and of the membrane which divides the cheſt; as well as of a remarkable thinneſs in the diaphragm or midriff. This diſproportion has been obſerved to be ſo great, that the heart and lungs have been almoſt of twice their natural ſize, perfectly ſound, and without any ulceration whatever, or any defect in the wind-pipe or its glands. Hence it appears, that this enormous ſize of the lungs, and the ſpace they occupy, by hindering the free action of the midriff, is the chief cauſe of this diſorder: and as the ſubſtance of the lungs was found more fleſhy than uſual, they of courſe muſt loſe a great deal of their ſpring and tone.

Whoever conſiders a broken-wind in this light, muſt own that it may be reckoned among the incurable diſtempers of horſes; and that all the boaſted pretenſions to cure are vain and frivolous, ſince the utmoſt ſkill can amount to no more than now and then palliating the ſymptoms, and mitigating their violence.

We ſhall therefore only lay down ſuch methods as may probably prevent this diſorder, when purſued in time. But if they ſhould not ſucceed, we ſhall offer ſome remedies and rules to mitigate its force, and make a horſe as uſeful as poſſible under this malady.

It is uſual, before a broken-wind appears, for a horſe to have a dry obſtinate cough, without any viſible ſickneſs or loſs of appetite; but, on the contrary, a diſpoſition to foul feeding, eating the litter, and drinking much water.

In order then to prevent, as much as poſſible, this diſorder, bleed him, and give him the mercurial phyſic above preſcribed, which ſhould be repeated two or three times.

Broken Wind.

The following balls are then to be taken for ſome time, which have been found extremely efficacious in removing obſtinate coughs.

> TAKE aurum moſaicum, finely powdered, eight ounces; myrrh and elecampane, powdered, each four ounces; aniſeeds and bay-berries, each an ounce; ſaffron, half an ounce; make into balls with oxymel ſquills.

The aurum moſaicum is made of equal parts of quickſilver, tin, ſal ammoniac, and ſulphur. We give this medicine as ſtrongly recommended by Mr Gibſon; but how far the aurum moſaicum may contribute to its efficacy, may perhaps juſtly be diſputed: as a ſubſtitute in its room, therefore, for this purpoſe, we recommend the ſame quantity of powdered ſquills, or gum ammoniacum, or equal parts of each.

Broken-winded horſes ſhould eat ſparingly of hay, which as well as their corn may be wetted with chamber-lye, or fair water; as this will make them leſs craving after water.

The volatile ſalts in the urine may make it preferable to water, and may be the reaſon why garlic is found ſo efficacious in theſe caſes; two or three cloves given at a time in a feed, or three ounces of garlic bruiſed, and boiled in a quart of milk and water, and given every other morning for a fortnight, having been found very ſerviceable; for by warming and ſtimulating the ſolids, and diſſolving the tenacious juices which choke up the veſſels of the lungs, theſe complaints are greatly relieved.

Careful feeding and moderate exerciſe has greatly relieved broken-winded horſes.

Horſes ſent to graſs in order to be cured of an obſtinate cough, have often returned completely broken-winded, where the paſture has been rich and ſucculent, ſo that they have had their bellies conſtantly full. As the ill conſequences therefore are obvious, where you have not the conveniency of turning out your horſe for a conſtancy, you may ſoil him for a month or two with young green barley, tares, or any other young herbage.

To purſive thick-winded horſes, Barbadoes and common tar have often been given with ſucceſs, to the quantity of two ſpoonfuls, mixed with the yolk of an egg, diſſolved in warm ale, and given faſting two or three times a week, eſpecially thoſe days you hunt or travel.

But in order to make all theſe ſorts of horſes of any real ſervice to you, the grand point is to have a particular regard to their diet, obſerving a juſt economy both in that and their exerciſe; giving but a moderate quantity of hay, corn or water, at a time, and moiſtening the former, to prevent their requiring too much of the latter, and never exerciſing them but with moderation, as has before been obſerved. The following alterative ball may be given once a fortnight or three weeks, and as it operates very gently, and requires no confinement but on thoſe days it is given when warm meat and water are neceſſary, it may be continued for two or three months.

> TAKE ſocotorine aloes ſix drams; myrrh, galbanum, and ammoniacum, of each two drams; bay-berries,

Broken-Wind.

ries half an ounce: make into a ball with a ſpoonful of oil of amber, and a ſufficient quantity of ſyrup of buckthorn.

Mr Taplin ridicules the idea of overgrown lungs, and ſuggeſts the following as grounds of a more rational opinion concerning the ſource of this diſeaſe.

"Whether horſes who have been in the habit of full or foul feeding, with a very trifling portion of exercife, and without any internal cleanſing from evacuations, compulſively obtained by purgatives or diuretics, may not conſtantly engender a quantity of viſcid, tough, phlegmatic, matter; which accumulating by ſlow degrees, may ſo clog and fill up ſome of that infinity of minute paſſages with which the lungs are known to abound, as probably to obſtruct the air veſſels in their neceſſary expanſion for the office of reſpiration? And whether this very probable obſtruction or partial ſuppreſſion may not in ſudden, haſty, and long continued exertions, rupture others, and by ſuch local deficiency affect the elaſticity of the whole? The probability, and indeed great appearance of this progreſs, has ever influenced me forcibly to believe, that ſuch obſtructions once formed, the evil accumulates, till a multiplicity of the veſſels become impervious, and render the lungs, by their conſtant accumulation and diſtention, too rigid for the great and neceſſary purpoſe of reſpiration."

That ſuch a defect may ſometime, occur, as a cheſt too narrow for lungs of an uncommon extenſion, that conſtitute naturally what are called *thick-winded horſes*, our author does not deny: in which caſes it is agreed, there is no hope of a cure, nor ſcarcely of any alleviation. But he will by no means admit the above deformity to be a caſe of common occurrence, far leſs that it is the univerſal or even moſt ordinary cauſe of broken wind.

"It cannot but be obſerved (ſays he) what an anxious deſire a broken-winded horſe always diſplays to obtain water; a ſelf-evident conviction he is rendered uneaſy by ſome glutinous adheſive internal ſubſtance, that inſtinct alone prompts the animal to expect drinking may waſh away: on the contrary, if, as Bartlet and Gibſon ſuppoſe, 'the lungs are too large for the cheſt,' every thing that increaſes the bulk of the abdomen or viſcera (and conſequently the preſſure upon the diaphragm) muſt increaſe the diſquietude, which is natural to believe from the ſagacity of animals in other inſtances, they would in this moſt carefully avoid."

Mr Taplin therefore concludes, that if his hypotheſis is founded in fact (which circumſtances will not allow him the leaſt reaſon to doubt), a cure may certainly be expected, provided the attempt is made upon the firſt appearance of the diſeaſe; though he does not hold out the probability where the original cauſe has been of long ſtanding, and no attempts made to relieve.

In attempting the cure, the natural and obvious indications are, To promote the neceſſary evacuations in the firſt inſtance, to attenuate the viſcidity of the glutinous obſtructed matter, and to deterge the paſſages by a ſtimulation of the ſolids. Bleeding is therefore the firſt meaſure; and it ought to be repeated at proper intervals in moderate quantities, till diveſted of the coat of ſize and livid appearance that are certain ſigns of the lungs being obſtructed either by viſcidity or inflammation. After bleeding, the horſe muſt go thro' a regular courſe of the mild purging balls preſcribed after recovery from pleuriſy. They are ſlightly impregnated with mercurial particles, and blended with the gums form a moſt excellent medicine for the purpoſe. In three days after the operation of the third doſe, Mr Taplin directs to begin upon the following detergent balſamics, and continue to give one ball every morning, ſo long as may be thought neceſſary to form a fair opinion whether the advantage is gained or relief likely to be obtained.

> TAKE of the beſt white ſoap eight ounces; gum guaiacum and ammoniacum, each three ounces; myrrh and Benjamin, aniſeed and liquorice, each two ounces; balſam of Peru, Tolu, and oil of aniſeed, each half an ounce; Barbadoes tar ſufficient to make a maſs, which divide into twenty balls.

It is neceſſary to be ſtrictly obſerved, that during this courſe, hay and water are to be diſpenſed with a very ſparing hand, ſo as to prevent too great an accumulation in the ſtomach or inteſtines, that an obſervation may be made with the greateſt certainty, whether any hopes of ſucceſs from medicine may be juſtly entertained; if not, farther expence will be unadviſable, as it will appear after ſuch trial, an incurable malady at all events, and only ſuſceptible of palliation.

Conſumption.

SECT. XII. *Of a Conſumption.*

WHEN a conſumption proceeds from a defect in a horſe's lungs or any principal bowel, the eyes look dull; the ears and feet are moſtly hot; he coughs ſharply by fits; ſneezes much, and frequently groans with it; his flanks have a quick motion: he gleets often at the noſe, and ſometimes throws out a yellowiſh curdled matter; and he has little appetite to hay, but will eat corn, after which he generally grows hot.

As to the cure, one of the principal things is bleeding in ſmall quantities (a pint, or pint and half, from ſome horſes is ſufficient), which ſhould be repeated as often as the breath is more than ordinarily oppreſſed. Pectorals may be given to palliate preſent ſymptoms; but as diſſections have diſcovered both the glands of the lungs and meſentery to be ſwelled, and often indurated, the whole ſtreſs lies on mercurial purges, and the following ponderous alteratives, given intermediately.

> TAKE native cinnabar, or cinnabar of antimony, one pound, powdered very fine, and add the ſame quantity of gum guaiacum and nitre; give the horſe an ounce of this powder twice a-day, wetting his feeds.

The ſpring graſs is often extremely ſerviceable; but the ſalt marſhes are to be preferred, and to be more depended on than medicines; for great alterations are thereby made in the blood and juices, and no ſmall benefit ariſes from open air and proper exerciſe.

SECT. XIII. *Of Apoplexy or Staggers, Lethargy, Epilepſy and Palſy.*

FARRIERS generally include all diſtempers of the head under two denominations, viz. *ſtaggers* and *convulſions*, wherein they always ſuppoſe the head primarily affected. But in treating theſe diſorders, we will diſtinguiſh

Apoplexy, Lethargy, &c.

ſtinguiſh between thoſe that are peculiar to the head, as having their ſource originally thence; and thoſe that are only concomitants of ſome other diſeaſe.

In an apoplexy a horſe drops down ſuddenly, without other ſenſe or motion than a working at his flanks.

The previous ſymptoms are, drowſineſs; watery eyes, ſomewhat full and inflamed; a diſpoſition to reel; feebleneſs; a bad appetite; the head almoſt conſtantly hanging, or reſting on the manger; ſometimes with little or no fever, and ſcarce any alteration in the dung or urine; the horſe is ſometimes diſpoſed to rear up, and apt to fall back when handled about the head; which is often the caſe with young horſes, to which it does not ſuddenly prove mortal, but with proper help they may ſometimes recover. If the apoplexy proceeds from wounds or blows on the head, or matter on the brain; beſides the above ſymptoms, the horſe will be frantic by fits, eſpecially after his feeds, ſo as to ſtart and fly at every thing. Theſe caſes ſeldom admit of a perfect recovery; and when horſes fall down ſuddenly, and work violently at the flanks, without any ability to riſe after a plentiful bleeding, they ſeldom recover.

All that can be done is to empty the veſſels as ſpeedily as poſſible, by ſtriking the veins in ſeveral parts at once, bleeding to four or five quarts; and to raiſe up the horſe's head and ſhoulders, ſupporting them with plenty of ſtraw. If he ſurvives the fit, cut ſeveral rowels: give him night and morning glyſters prepared with a ſtrong decoction of ſenna and ſalt, or the purging glyſter mentioned in the directions; blow once a day up his noſtrils a dram of powder of aſarabacca, which will promote a great diſcharge; afterwards two or three aloetic purges ſhould be given; and to ſecure him from a relapſe, by attenuating and thinning his blood, give him an ounce of equal parts of antimony and crocus metallorum for a month; or, which is preferable, the ſame quantity of cinnabar of antimony and gum guaiacum.

If the fit proceeds only from fulneſs of blood, high feeding, and want of ſufficient exerciſe, or a ſizy blood (which is often the caſe with young horſes, who though they reel, ſtagger, and ſometimes ſuddenly fall down, yet are eaſily cured by the above method), an opening diet with ſcalded bran and barley will be neceſſary for ſome time; and the bleeding may be repeated in ſmall quantities.

As to the other diſorders of the head, ſuch as lethargy or ſleeping evil, epilepſy or falling-ſickneſs, vertigo, frenzy, and madneſs, convulſions, and paralytical diſorders, as they are moſt of them to be treated as the apoplexy and epilepſy, by bleeding and evacuations, with the alteratives there directed, we ſhall wave treating of them ſeparately; but mention ſome particular rules to diſtinguiſh them, according to the plan we laid down; and then offer ſome general remedies for the ſeveral purpoſes.

In an epilepſy, or falling-ſickneſs, the horſe reels and ſtaggers, his eyes are fixed in his head, he has no ſenſe of what he is doing, he ſtales and dungs inſenſibly, he runs round and falls ſuddenly; ſometimes he is immoveable, with his legs ſtretched out as if he was dead, except only a quick motion of his heart and lungs, which cauſes a violent working of his flanks; ſometimes he has involuntary motions, and ſhaking of his limbs, ſo ſtrong, that he has not only beat and ſpurned his litter, but the pavement with it; and with theſe alternate ſymptoms a horſe has continued more than three hours, and then has as ſurpriſingly recovered: at the going off of the fit, he generally foams at the mouth, the foam being white and dry, like what comes from a healthful horſe when he champs on the bit.

Apoplexy, Lethargy, &c.

But in all kinds of gripes, whether they proceed from diſorders in the guts, or retention of urine, a horſe is often up and down, rolls and tumbles about; and when he goes to lie down, generally makes ſeveral motions with great ſeeming carefulneſs, which ſhows he has a ſenſe of his pain; and if he lies ſtretched out for any time, it is generally but for a ſhort ſpace.

Epilepſies and convulſions may ariſe from blows on the head, too violent exerciſe, and hard ſtraining; and from a fulneſs of blood, or impoveriſhed blood; and ſurfeits; which are ſome of the cauſes that denote the original diſorder.

In lethargic diſorders, the horſe generally reſts his head with his mouth in the manger, and his pole often reclined to one ſide; he will ſhow an inclination to eat, but generally falls aſleep with his food in his mouth, and he frequently ſwallows it whole without chewing: emollient glyſters are extremely neceſſary in this caſe, with the nervous balls recommended for the ſtaggers and convulſions; ſtrong purges are not requiſite, nor muſt you bleed in too large quantities, unleſs the horſe be young and luſty. In old horſes, rowels and large evacuations are improper; but volatiles of all kinds are of uſe when they can be afforded; the alterative purge mentioned at the end of this ſection may be given and repeated on amendment.

This diſtemper is to be cured by theſe means, if the horſe is not old and paſt his vigour. It is a good ſign if he has a tolerable appetite, and drinks freely without ſlabbering, and if he lies down and riſes up carefully, though it be but ſeldom.

But if a lethargic horſe does not lie down; if he is altogether ſtupid and careleſs, and takes no notice of any thing that comes near him; if he dungs and ſtales ſeldom, and even while he ſleeps and dozes, it is a bad ſign: if he runs at the noſe thick white matter, it may relieve him; but if a viſcid gleet, that ſticks to his noſtrils like glue, turn to a profuſe running of ropy, reddiſh, and greeniſh matter, it is an infallible ſign of a great decay of nature, and that it will prove deadly.

Young horſes from four to ſix years, are very ſubject to convulſions, from botts in the ſpring; and the large coach breed more than the ſaddle. They are ſeized without any previous notice; and if botts and worms are diſcovered in their dung, the cauſe ſeems to be out of doubt, more eſpecially if they have lately come out of a dealer's hands.

When this convulſion proceeds from a diſtemperature of the midriff, or any of the principal bowels, it is to be diſtinguiſhed from botts and vermin by previous ſymptoms; the horſe falls off his ſtomach, and grows gradually weak, feeble, and diſpirited, in his work, and turns ſhort-breathed with the leaſt exerciſe.

The lively deſcription of that univerſal cramp or convulſion, called by ſome the *ſtag-evil*, which ſeizes all the muſcles of the body at once, and locks up the jaws ſo that it is impoſſible almoſt to force them open, we [illegible] give in Mr Gibſon's own words, who ſays: *As* [illegible]

Apoplexy, Lethargy, &c.

the horſe is ſeized, his head is raiſed with his noſe towards the rack, his ears pricked up, and his tail cocked, looking with eagerneſs as an hungry horſe when hay is put down to him, or like a high-ſpirited horſe when he is put upon his mettle; inſomuch, that thoſe who are ſtrangers to ſuch things, when they ſee a horſe ſtand in this manner, will ſcarce believe any thing of conſequence ails him; but they are ſoon convinced, when they ſee other ſymptoms come on apace, and that his neck grows ſtiff, cramped, and almoſt immoveable: and if a horſe in this condition lives a few days, ſeveral knots will ariſe on the tendinous parts thereof, and all the muſcles, both before and behind, will be ſo much pulled and cramped, and ſo ſtretched, that he looks as if he was nailed to the pavement, with his legs ſtiff, wide, and ſtraddling; his ſkin is drawn ſo tight on all parts of the body, that it is almoſt impoſſible to move it; and if trial be made to make him walk, he is ready to fall at every ſtep, unleſs he be carefully ſupported; his eyes are ſo fixed with the inaction of the muſcles, as give him a deadneſs in his looks; he ſnorts and ſneezes often, pants continually with ſhortneſs of breath; and this ſymptom increaſes continually till he drops down dead; which generally happens in a few days, unleſs ſome ſudden and very effectual turn can be given to the diſtemper.

In all theſe caſes the horſe ſhould firſt be bled plentifully, unleſs he is low in fleſh, old, or lately come off any hard continued duty; then you muſt be more ſparing of his blood; afterwards give the following ball:

TAKE aſafetida half an ounce, Ruſſia caſtor powdered two drams, valerian root powdered one ounce; make into a ball with honey and oil of amber.

This ball may be given twice a-day at firſt; and then once, waſhed down with a decoction of miſletoe or valerian ſweetened with liquorice or honey: an ounce of aſafetida may be tied up in a piece of ſtrong coarſe linen rag, and put behind his grinders to champ on.

The laxative purges and emollient glyſters ſhould be given intermediately to keep the body open; but when the former balls have been taken a week or ten days, the following may be given once a-day with the valerian decoction.

TAKE cinnabar of antimony ſix drams; aſafetida half an ounce; ariſtolochia, myrrh, and bay-berries, of each two drams; make into a ball with treacle and oil of amber.

This is the moſt effectual method of treating theſe diſorders; but when they are ſuſpected to ariſe from botts and worms, which is generally the caſe, mercurial medicines may lead the way, thus:

TAKE mercurius dulcis and philonium, of each half an ounce; make into a ball with conſerves of roſes, and give the horſe immediately: half the quantity may be repeated in four or five days.

The following infuſion ſhould then be given, to the quantity of three or four horns, three or four times a-day, till the ſymptoms abate; when the above nervous balls may be continued till they are removed.

TAKE penny-royal and rue of each two large handfuls, camomile flowers one handful, aſafetida and caſtor of each half an ounce, ſaffron and liquorice-root ſliced of each two drams; infuſe in two quarts of boiling water; pour off from the ingredients as wanted.

Apoplexy, Lethargy, &c.

If the caſtor is omitted, add an ounce of aſafetida.

The following ointment may be rubbed into the cheeks, temples, neck, ſhoulders, ſpine of the back, and loins, and wherever there is the greateſt contractions and ſtiffneſs.

TAKE nerve and marſhmallow ointment of each four ounces, oil of amber two ounces, with a ſufficient quantity of camphorate ſpirit of wine; make a liniment.

When the jaws are ſo locked up that medicines cannot be given by the mouth, it is more eligible to give them by way of glyſter: for forcing open the jaws by violence often puts a horſe into ſuch agonies, that the ſymptoms are thereby increaſed.

In this caſe alſo he muſt be ſupported by nouriſhing glyſters, made of milk-pottage, broths, &c. which muſt be given to the quantity of three or four quarts a-day: glyſters of this kind will be retained, and abſorbed into the blood; and there have been inſtances of horſes thus ſupported for three weeks together, who muſt otherwiſe have periſhed.

Mr Gibſon mentions ſome extraordinary inſtances of ſucceſs in caſes of this ſort by theſe methods, and repeated frictions, which are extremely ſerviceable in all convulſive diſorders, and often prevent their being jaw-ſet; they ſhould be applied with unwearied diligence every two or three hours, wherever any ſtiffneſs or contractions in the muſcles appear; for a horſe in this condition never lies down till they are in ſome meaſure removed.

The uſe of rowels in theſe caſes is generally unſucceſsful, the ſkin being ſo tenſe and tight, that they ſeldom digeſt kindly, and ſometimes mortify: ſo that if they are applied, they ſhould be put under the jaws, and in the breaſt.

The red-hot iron ſo frequently run through the foretop and mane, near the occipital bone, for this purpoſe, has often been found to have deſtroyed the cervical ligament.

In paralytic diſorders, where the uſe of a limb or limbs is taken away, the internals above recommended ſhould be given, in order to warm, invigorate, and attenuate the blood; and the following ſtimulating embrocation ſhould be rubbed into the parts affected.

TAKE oil of turpentime four ounces, nerve ointment and oil of bays of each two ounces, camphor rubbed fine one ounce, rectified oil of amber three ounces, tincture of cantharides one ounce.

With this liniment the parts affected ſhould be well bathed for a conſiderable time, to make it penetrate: and when the hind parts chiefly are lame, the back and loins would be well rubbed with the ſame. To the nervous medicines above recommended may be added ſnake-root, contrayerva, muſtard-ſeed, horſe-radiſh root, ſteeped in ſtrong beer, or wine where it can be afforded. Take the following for an example, which may be given to the quantity of three pints a-day alone, or two horns full may be taken after the nervous balls.

TAKE ſnake-root, contrayerva, and valerian, of each half an ounce; muſtard-ſeed and horſe-radiſh root ſcraped, of each two ounces; long pepper two drams: infuſe in three pints of ſtrong wine.

When

Strangles and Vives.

When the horſe is recovering from any of the above diſorders, the following alterative purge may be repeated two or three times, as it operates very gently.

Take ſocotorine aloes one ounce, myrrh half an ounce, aſafetida and gum ammoniacum of each two drams, ſaffron one dram; make into a ball with any ſyrup.

Where a retention of dung is the cauſe of this diſorder, the great gut ſhould firſt be raked thoroughly with a ſmall hand, after which plenty of emollient oily glyſters ſhould be thrown up, and the opening drink given, till the bowels are thoroughly emptied of their impriſoned dung. Their diet ſhould for ſome days be opening, and conſiſt chiefly of ſcalded bran, with flour of brimſtone, ſcalded barley, &c.

Sect. XIV. *Of the Strangles, and Vives.*

1. The Strangles is a diſtemper to which colts and young horſes are very ſubject. The ſymptoms and progreſs of this diſeaſe are as follows: A dull heavineſs and inactivity, loſs of appetite, and a hollow huſky cough, occaſioned by the irritability of the inflamed glandular parts in the throat and about the root of the tongue. To excite a degree of moiſture in the mouth that may allay this diſagreeable ſenſation, the horſe is often picking his hay, but eats little or none; a degree of ſymptomatic heat comes on, and a conſequent clamminess and thirſt is perceptible. As the diſtemper advances, he becomes proportionally languid and inattentive; a ſwelling (with ſometimes two or three ſmaller ſurrounding it) is now diſcovered to have formed itſelf between the jaw-bones, which is at firſt very hard, exceeding painful, and viſibly increaſing; he now ſwallows with difficulty, heaves in the flanks, and his whole appearance gives ſigns of the greateſt diſtreſs.

The firſt object for conſideration is the ſtate of the ſubject: if the evacuations are regular (as they generally are), and the feveriſh ſymptoms moderate, let the ſwelling be examined, and its ſuppuration promoted. For this purpoſe (firſt clipping away all the long or ſuperfluous hairs that cover or ſurround the part, foment with ſmall double flannels, dipt in a ſtrong decoction of camomile, marſh-mallows, or roſemary, for ten minutes, as hot as can be conveniently ſubmitted to; and then apply a poultice prepared as follows.

Take of coarſe bread, barley meal, and camomile or elder flowers, each a handful; boil over the fire in a ſufficient quantity of milk, or in the decoction for the fomentation; into which ſtir about a third (of the whole quantity) of white-lily root, waſhed clean and pounded to a paſte; adding linſeed and fenugreek (in powder) of each an ounce; ſtirring in, while hot, of turpentine two ounces, and of lard four, laying it on moderately warm, and bandaging firm. To ſerve for two poultices.

Both the fomentation and poultice muſt be repeated every night and morning till an opening in the ſwelling is effected, which generally happens in the courſe of five or ſix days. Upon the appearance of diſcharge, the aperture may be a little enlarged with a biſtory or the point of any ſharp inſtrument adequate to the purpoſe, though this will be unneceſſary if the diſcharge is made freely and eaſily of itſelf. The part ſhould then be dreſſed with the following ointment ſpread on tow, ſtill continuing the poultice over it to promote the digeſtion, and prevent any remaining hardneſs.

Strangles and Vives.

Take roſin and Burgundy pitch of each a pound and a half, honey and common turpentine each eight ounces, yellow wax four ounces, hog's-lard one pound, verdigris finely powdered one ounce; melt the ingredients together, but do not put in the verdigris till removed from the fire; and it ſhould be ſtirred in by degrees till the whole is grown ſtiff and cool.

If the fever and inflammation run high, and the ſwelling be ſo ſituated as to endanger ſuffocation, a moderate quantity of blood muſt be taken away.

In this diſorder, maſhes muſt be the conſtant food, in ſmall proportions, to prevent waſte: in each of which Mr Taplin directs to put of liquorice and aniſeed powders half an ounce, and about two ounces of honey, or in lieu of this laſt a quart of malt: The drink, conſiſting of warm water impregnated with a portion of ſcalded bran or water-gruel, ſhould be given in ſmall quantities and often. The head muſt be kept well covered with flannel, as the warmth will greatly tend to aſſiſt in promoting the neceſſary diſcharge: tho', unleſs circumſtances and weather forbid, the horſe need not be confined, but ſhould have the advantage of air and ſhort gentle exerciſe. Nor ſhould regular dreſſing, and the accuſtomed courſe of ſtable diſcipline, be omitted, but only uſed in a leſs degree than formerly when in health.

This diſtemper is ſeldom dangerous, unleſs from neglect, ignorant treatment, or cruel uſage. It generally terminates with a running at the noſe, in a greater or leſs degree; which ſhould be frequently cleanſed from the inſide of the noſtrils, by means of a ſponge ſufficiently moiſtened in warm water, to prevent its acquiring an adheſion to thoſe parts, or a foulneſs and fetor that would ſhortly become acrimonious.

If a hardneſs remains after the ſores are healed up, they may be anointed with the following mercurial ointment.

Take of crude mercury or quickſilver one ounce, Venice turpentine half an ounce; rub together in a mortar till the globules of the quickſilver are no longer viſible; then add, by little and little, two ounces of hog's-lard, juſt warm and liquefied; and let the whole be kept cloſe covered for uſe. When the horſe has recovered his ſtrength, purging will be neceſſary.

If a copious and offenſive diſcharge from the noſtrils ſhould continue after the abſceſs is healed up, there will be reaſon to ſuſpect the diſeaſe called *glanders*, treated of in a ſubſequent ſection.

2. The Vives or Ives differ from the ſtrangles only in this; that the ſwellings of the kernels ſeldom gather or come to matter, but by degrees perſpire off and diſperſe by means of warm cloathing, anointing with the marſhmallow ointment, a moderate bleeding, and a doſe or two of phyſic. But ſhould the inflammation continue notwithſtanding thoſe means, a ſuppuration muſt be promoted by the methods recommended in the ſtrangles.

When theſe ſwellings appear in an old or full-aged horſe, they are ſigns of great malignity, and often of

Diſeaſes of the Eyes.

an inward decay, as well as forerunners of the glanders.

Sect. XV. *Of the Diſeaſes of the Eyes.*

1. The caſes that moſt frequently occur, requiring medical aid, or admitting of cure, are generally the effects either of cold, or of blows, bites, or other external injuries. In thoſe proceeding immediately from cold, there is perceived an inflammation upon the globe of the eye, and internal ſurrounding parts, as the edges of the eye-lids, &c. Inſtead of its former tranſparency, the eye has a thick cloudy appearance upon its outer covering, and is conſtantly diſcharging an acrid ſerum, which in a ſhort time almoſt excoriates the parts in its paſſage. The horſe drops his ears, becomes dull and ſluggiſh, is frequently ſhaking his head as if to ſhake off the ears, and in every action diſcovers pain and diſquietude. In this caſe, after bleeding, the treatment preſcribed in the Section of *Colds* muſt be adopted and perſevered in; and to cool the parts, and allay the irritation occaſioned by the ſcalding ſerum, let the eyes and ſurrounding parts be gently waſhed twice or thrice every day with a ſponge or tow impregnated with the following ſolution:

Sugar of lead one dram, white vitriol two ſcruples, ſpring water half a pint, brandy or camphorated ſpirits one ounce or two table-ſpoonfuls.

If the inflammation ſhould not ſeem likely to abate, but to wear a threatening appearance, the following diuretic medicine muſt be adminiſtered.

Castile Soap twelve ounces, yellow roſin and nitre (in powder) each eight ounces, powdered camphire one ounce, and oil of juniper ſix drams; mixed with a ſufficient quantity of ſyrup or honey. The maſs is to be divided into 12 balls, rolled up in liquorice or aniſeed powder; one of which is to be given every morning, uſing alſo gentle work or moderate exerciſe.

2. The effects ariſing from blows or bites form different appearances, according to the ſeverity of the injury ſuſtained. Should inflammation and ſwelling proceed from either cauſe, bleeding will be neceſſary without delay, and may be repeated at proper intervals till the ſymptoms appear to abate; and let the parts be plentifully embrocated four times a-day with the following preparation of Goulard's cerate.

Extract of Saturn three drams: camphorated ſpirits one ounce; river or pond water one-pint. The extract to be firſt mixed with the ſpirits, and then the water to be added.

If a large ſwelling, laceration, or wound, attends; after waſhing with the above, apply a warm poultice of bread, milk, and a little of the lotion, ſoftened with a ſmall portion of hog's-lard or olive oil. In caſes of leſs danger, or in remote ſituations where medicines are not eaſily procured, the following may be uſed as a ſubſtitute.

Best white-wine vinegar half a pint, ſpring water a quarter of a pint, and beſt brandy a wine glaſs or half a gill.

3. As to the gutta ſerena, cataract, film, &c. theſe are caſes in which relief is very ſeldom obtained.

The gutta ſerena is a partial or univerſal loſs of ſight, where no palpable defect or fault appears in the eye, except that the pupil is a little more enlarged or contracted. The appearances of this blemiſh are various, as well as the cauſes and effects, ſome of its ſubjects being totally blind, and others barely enabled to diſtinguiſh between light and darkneſs. The ſigns are a blackneſs of the pupil, an alteration of the ſize of the eye, and its not contracting or dilating upon a ſudden expoſure to any degree of light. In order to the cure, it is neceſſary to attend to the cauſe, and to apply ſuch remedies as that may indicate: though in truth it is a diſorder in which, from whatever cauſe originating, no great expectation can be formed from medicine either internally or externally: more particularly from the former, the ſeat of diſeaſe being ſo far out of the reach of medicinal action. If the defect ſhould be owing to a contraction of or compreſſion upon the optic nerve, very little can be done with any expectation of ſucceſs: and much leſs if it ariſes from a palſy of that or any neighbouring part.

Diſeaſes of the Eyes.

A cataract is a defect in the cryſtalline humour of the eye, which, becoming opaque, prevents the admiſſion of thoſe rays upon the retina that conſtitute viſion. The diſorder called *moon-eyes*, are only cataracts forming. Theſe generally make their appearance when a horſe is turned five coming ſix; at which time one eye becomes clouded, the eye-lids being ſwelled, and very often ſhut up; and a thin water generally runs from the diſeaſed eye down the cheek, ſo ſharp as ſometimes to excoriate the ſkin; the veins of the temple, under the eye, and along the noſe, are turgid and full: though ſometimes it happens that the eye runs but little. This diſorder comes and goes till the cataract is ripe; then all pain and running diſappears, and the horſe becomes totally blind, which is generally in about two years. During this time ſome horſes have more frequent returns than others; which continue in ſome a week or more, in others three or four; returning once in two or three months, and they are ſeldom ſo long as five without a relapſe. There is another kind of *moon blindneſs* which is alſo the forerunner of cataracts, where no humour or weeping attends. The eye is never ſhut up or cloſed here, but will now and then look thick and troubled, at which time the horſe ſees nothing diſtinctly: when the eyes appear ſunk and periſhing, the cataracts are longer of coming to maturity; and it is not unuſual in this caſe for one eye to eſcape. Theſe caſes generally end in blindneſs of one if not of both eyes. The moſt promiſing ſigns of recovery are when the attacks come more ſeldom, and their continuance grows ſhorter, and that they leave the cornea clear and tranſparent, and the globe plump and full.

In all blemiſhes or defects, where a thickening of ſome one of the coats, membranes, or humours of the eye, has formed an appearance of cataract or film, it has been an eſtabliſhed cuſtom among moſt farriers to beſtow a plentiful application of corroſive powders, unguents, and ſolutions, for the purpoſes of obliteration; without reflecting (as Mr Taplin obſerves) upon the abſurdity of endeavouring to deſtroy by corroſion, what is abſolutely ſeparated from the ſurface by a variety of membranous coverings, according to the diſtinct ſeat of diſeaſe; with which it is impoſſible to bring the intended remedy into contact, without firſt deſtroying the intervening or ſurrounding parts by which the inner delicate ſtructure is ſo numerouſly guarded. But in all diſorders of this ſort, whether moon-eyes or confirmed

Glanders.

firmed cataracts with a weeping, general evacuations with internal alteratives can only take place. Indeed the attempts to cure cataracts have hitherto generally produced only a palliation of the ſymptoms, and ſometimes have proved entirely deſtructive. Yet early care, it is ſaid, has in ſome inſtances proved ſucceſsful. To this end rowelling is preſcribed, with bleeding at proper intervals, except where the eyes appear ſunk and periſhing. It is alſo directed, during the violence of the ſymptoms, to obſerve a cooling treatment; giving the horſe two ounces of nitre every day mixed into a ball with honey; and bathing the parts above the eye with verjuice or vinegar wherein roſe-leaves are infuſed, to four ounces of which half a drachm of ſugar of lead may be added. The ſwelling on the lid may afterwards be bathed with a ſponge dipt in equal parts of lime and Hungary water mixed together; and the following cooling phyſic ſhould be given every fourth day, till the eye becomes clear.

LENITIVE electuary and cream of tartar of each four ounces, Glauber's ſalts three ounces, ſyrup of buckthorn two ounces.

When the weeping is by theſe means removed, the alterative powders (ſee the Section *Of Alterative Medicines*) ſhould be given every day, till two or three pounds are taken, and after an interval of three months the ſame courſe ſhould be repeated. This method, it is affirmed, has often been attended with good ſucceſs, where the eyes have been full and no way periſhed.

4. The haws is a ſwelling and ſpongineſs that grows in the inner corner of the eye, ſo large ſometimes as to cover a part of the eye. The operation here is eaſily performed by cutting part of it away; but the farriers are apt to cut away too much: the wound may be dreſſed with honey of roſes; and if a fungus or ſpongy fleſh ariſes, it ſhould be ſprinkled with burnt alum, or touched with blue vitriol.

SECT. XVI. *Of the glanders.*

M. DE LA FOSSE has diſtinguiſhed ſeven different kinds of glanders, four of which are incurable.

The firſt proceeds from ulcerated lungs, the purulent matter of which comes up the trachea, and is diſcharged through the noſtrils, like a whitiſh liquor, ſometimes appearing in the lumps and grumes: in this diſorder, though the matter is diſcharged from the noſtrils, yet the malady is ſolely in the lungs.

The ſecond is a waſting humour, which uſually ſeizes horſes at the decline of a diſeaſe, cauſed by too hard labour; this defluxion alſo proceeds from the lungs.

The third is a malignant diſcharge, which attends the ſtrangles ſometimes, and falls upon the lungs, which runs off by the noſtrils.

The fourth is, when an acrimonious humour in the farcy ſeizes theſe parts, where it ſoon makes terrible havock.

The fifth kind we ſhall deſcribe by and by, as ariſing from taking cold.

The ſixth kind is a diſcharge from the ſtrangles, which ſometimes vents itſelf at the noſtrils.

In the ſeventh ſort, which he calls the *real glanders*, the diſcharge is either white, yellow, or greeniſh, ſometimes ſtreaked or tinged with blood: when the diſeaſe is of long ſtanding, and the bones are fouled, the matter turns blackiſh, and becomes very fetid; and is always attended with a ſwelling of the kernels or glands under the jaws; in every other reſpect the horſe is generally healthy and ſound, till the diſtemper has been of ſome continuance.

Glanders.

It is always a bad ſign when the matter ſticks to the inſide of the noſtrils like glue or ſtiff paſte; when the inſide of the noſe is raw, and looks of a livid or lead colour; when the matter becomes bloody, and ſtinks; and when it looks of an aſh-colour. But when only a limpid fluid is firſt diſcharged, and afterwards a whitiſh matter, the gland under the jaw not increaſing, and the diſorder of no long continuance, we may expect a ſpeedy cure; for in this caſe, which ariſes from taking cold after a horſe has been overheated, the pituitary membrane is but ſlightly inflamed, the lymph in the ſmall veſſels condenſed, and the glands overloaded, but not yet ulcerated.

Our author affirms this diſeaſe to be altogether local; and that the true ſeat of it is in the pituitary membrane which lines the partition along the inſide of the noſe, the maxillary ſinuſes or cavities of the cheek-bones on each ſide the noſe, and the frontal ſinuſes or cavities above the orbits of the eyes: that the viſcera, as liver, lungs, &c. of glandered horſes, are in general exceeding ſound; and conſequently that the ſeat of this diſorder is not in thoſe parts, as has been aſſerted by moſt authors. But on nicely examining by diſſection the heads of ſuch horſes, he found the cavities abovementioned more or leſs filled with a viſcous ſlimy matter; and the membrane which lines both them and the noſtrils inflamed, thickened, and corroded with ſordid ulcers, which in ſome caſes had eat into the bones.

It is a curious remark of our author, that the ſublingual glands, or the kernels ſituated under the jaw-bone, which are always ſwelled in this diſtemper, do not diſcharge their lymph into the mouth, as in man, but into the noſtrils; and that he conſtantly found their obſtruction agreed with the diſcharge: if one gland only was affected, then the horſe diſcharged from one noſtril only; but if both were, then the diſcharge was from both.

The ſeat of this diſorder thus diſcovered, the mode of cure he had recourſe to was by trepanning theſe cavities, and taking out a piece of bone, by which means the parts affected may be waſhed with a proper injection, and in fine the ulcers deterged, healed, and dried up: and his ſucceſs, by his own account, was very great.

But as, from the obſervations ſince made by this gentleman, there are different ſpecies of the glanders: ſo the cure of the milder kinds may firſt be attempted by injections and fumigations. “Thus, after taking cold ſhould a horſe for 15 or 20 days diſcharge a limpid fluid or whitiſh matter from one or both noſtrils, the glands under the jaw rather growing harder than diminiſhing, we may expect it will degenerate into a true glanders. To prevent which, after firſt bleeding, and treating him as we have directed for a cold, let an emollient injection, prepared with a decoction of lintſeed, marſhmallows, elder camomile flowers, and honey of roſes, or ſuch like, be thrown up as far as poſſible with a ſtrong ſyringe, and repeated three times a-day: ſhould the running not leſſen or be removed in a fortnight by the uſe of this injection, a reſtringent one may now be prepared with tincture of roſes, lime-water, &c. and the noſtrils fumigated with the powders of frankincenſe, maſtich, amber, and cinnabar, burnt on an iron heated for that purpoſe; the fume of which may eaſily be conveyed through a tube into the noſtrils." Such is the method recommended by Bartlet, which he ſays has been found ſucceſsful when uſed in time. But a more particular courſe of precedure will be afterwards deſcribed, that the reader may have the fulleſt information concerning this moſt difficult diſeaſe.

When the diſorder is inveterate, recourſe muſt be had to the operation above deſcribed, according to the doctrine of M. la Foſſe.

The pretenſions of that gentleman, however, have been lately expoſed with ſeeming juſtice by Mr Taplin: and the following circumſtances quoted from the French farrier's work ſeem ſufficient of themſelves to throw ſuſpicion upon the whole. We are told of three horſes he trepanned, each in two places: the internal parts were conſtantly ſyringed, and they were perfectly recovered; "the wound and perforation filling up in 26 days, the horſes ſuffering no inconvenience from the operation, though after this experiment they were PUT TO DEATH." We are at laſt confidently aſſured, that ſuch operations being performed, "after opening the cavities, ſhould it by probing be diſcovered that the bones are carious (or, in other words, rotten), the beſt way then will be to diſpatch the horſe, to ſave unneceſſary trouble and expence. Which Mr Taplin interprets in plain Engliſh thus: "Deprive the horſe of half his head, in compliment to the pecuniary feelings of the farrier; and if you find the remaining half will not anſwer the purpoſe of the whole, cut his throat, or ſhoot him through the head, to ſave the operator's credit."

Mr Taplin alſo condemns the diſtinction of the diſorder into different ſpecies; and the various ſymptoms that appear, he conſiders as only marking different ſtages of the ſame diſeaſe. The fact according to him appears to be, "that any corroſive matter diſcharged from the noſtrils, and ſuffered to continue for a length of time, ſo as to conſtitute ulcerations and corrode the bones, will inevitably degenerate into and conſtitute the diſeaſe generally underſtood by the appellation of glanders; every ſtagnant, acrimonious, or putrid matter, is poſſeſſed of this property, and more particularly when lodged (or by ſinuſes confined) upon any particular part. Diveſted of profeſſional trick, chicanery, and deception, this is the incontrovertible explanation, whether proceeding from an ulceration of the lungs, or the inveterate glandular diſcharges from the head (where the caſe is of long ſtanding, and the bone carious) they are equally incurable." In this view, therefore, prevention, rather than cure, being the rational object of attention, it remains only to point out ſuch methods as ſeem likely to obviate the diſorder upon the ſlighteſt appearance of its approach, or upon the attack of any other diſeaſe that may be likely to terminate in it.

Where the lungs, then, are the ſeat of diſeaſe, as in the firſt attack of coughs, &c. no better treatment can be purſued than that laid down under the Sections of *Colds* and *Coughs*. But where a ſwelling ſhows that matter is forming under the ears, jaws, or about the root of the tongue, let every poſſible method be taken to produce a ſuppuration and diſcharge of matter; for, in moſt caſes, an external evacuation becomes the criſis, and is greatly preferable to the chance of miſchiefs that may be produced by the morbid matter being abſorbed into the ſyſtem.

Should cough, difficulty of breathing, or a greater degree of inflammatory heat, attend, draw blood from a remote vein in moderate quantity, to mitigate either of thoſe ſymptoms; and when the ſwellings about the parts have acquired an evident prominence, foment them twice a-day, for two or three days, with flannels dipped in the following decoction:

CAMOMILE, wormwood, marſhmallows, and elder flowers, of each a large handful, boiled in three quarts of water for a quarter of an hour, and then ſtrained off. Let the liquor be uſed hot, and apply the herbs warm by way of poultice to the parts.

In two or three days a judgment may be formed whether a ſuppuration is likely to take place. If ſo the tumors will increaſe in ſize, and feel ſoft and yielding in the middle when preſſed; in which caſe apply the poultice, and proceed as directed above for the Strangles. If, on the contrary, the ſwellings continue hard and immoveable, a running coming on at the noſe; obſerve whether the matter is of a white colour and without ſmell; or is of different tinges, and ſtreaked with blood. The former is a favourable ſign; and in that caſe the treatment may be as directed under the Sections of *Cold* and *Cough*. But if the matter ſhould prove of the latter deſcription, every precaution ought to be inſtantly uſed, to prevent in its infancy what would ſoon become a caſe of much trouble. In the firſt place, therefore, in order to ſoften the viſcid matter in the paſſages, and relax the inflammatory ſtricture of the glands, prepare a vapour bath of roſemary, lavender flowers, ſouthernwood and marjoram (each a handful), boiled in two or three quarts of water. Put this into a pail, and let the horſe's head be fixed over it as near as can be borne, and ſo long as the fumes paſſing up the noſtrils can be ſuppoſed to take effect as an internal fomentation. This operation ſhould be repeated twice every day: and much of the treatment recommended under coughs and ſtrangles with glandular diſcharges from the noſtrils, will at the ſame time appear proper to be obſerved, as being applicable to many of the preſent ſymptoms. Let it be particularly remembered, that during, the whole courſe of management, the head of the horſe is to be kept as warm as poſſible, and in proportion much more ſo than the body, either in a double kerſey hood, or a ſingle external, and a flannel one underneath; as nothing can contribute more to a ſolution of the humours and promotion of their diſcharge, than a critical relaxation of the pores, particularly upon the very ſeat of diſeaſe.

In caſe the diſcharge ſhould continue to increaſe in quantity and virulence, become ſtill more diſcoloured, and its ſmell very offenſive; beſides continuing the fumigation, let half a gill of the following injection (milk warm) be thrown up either noſtril (or both if the matter ſhould be ſo diſcharged) with a ſtrong forcible ſyringe, three or four times a-day.

LINSEED, an ounce; camomile and elder flowers, each half an ounce; water, three pints. Boil for a few minutes; then ſtrain off, and add to the liquor four ounces of *mel Ægyptiacum,* mixing well together at each time of uſing.

If the matter ſhould notwithſtanding grow ſo malignant as to threaten a corroſion and rottenneſs of the bones; beſides a diligent uſe of both fumigation and injection, a courſe of mercurial unction muſt be immediately entered upon. Mr Taplin directs to "Let two, or at moſt three drams of the ſtrong mercurial ointment (prepared as directed under *Strangles*) be very well rubbed into the glandular tumors, under the throat or ears, every night for a fortnight; firſt taking away with the ſciſſars all ſuperfluous or long hairs, that the mercurial particles may be with more certainty abſorbed by the veſſels, and taken into the circulation. If the owner of a horſe labouring under this difficulty wiſhes, like a drowning man, to avail himſelf of another twig, he may call in the aid of mercurial phyſic, or alterative medicines."

Upon the whole of this ſubject: As long as the attack continues in its early and ſimple ſtate, let unremitting attention be paid to the treatment recommended under the different heads of thoſe ſymptoms that are then moſt predominant: but ſhould that treatment, after a fair trial, prove inſufficient to reſiſt the progreſs of the diſeaſe, the glands under the jaw-bone "continuing during the whole courſe inflexible, the matter firſt tinged with blood, then becoming deep in colour and moſt offenſive in ſmell, the carcaſe emaciated, and the whole frame ſinking under univerſal depreſſion, the firſt loſs (ſays Mr Taplin) will be ultimately beſt, in a reſignation of his hide to the collar-maker, and his remains to the hounds. As to the operation of trepanning, ſo plauſibly held forth with all its ſpecious advantages, I ſhall openly and fairly enter my proteſt againſt it. For what does the whole amount to more than this?—If the horſe ſhould abſolutely recover, and (what is ſtill more unlikely) become adequate to the very purpoſes he was deſtined to before the attack; when the long illneſs, ſupport, attendance, and farrier's bill, are balanced againſt his value, he muſt be a moſt excellent horſe, and very much above the line of mediocrity, to have the credit-account in his favour. In fact, the moſt probable conjecture is, his inevitable diſſolution: but ſhould he miraculouſly eſcape from both the diſtemper and operator, ranking under the denomination of *a cured horſe,* he may, perhaps, be then qualified to linger out a wretched exiſtence in ſome park or paſture, but never enabled to encounter labour or fatigue."

Taplin's Stable Directory, p. 306.

Ibid, p. 305.

SECT. XVII. *Of the Colic or Gripes, and Pain in the Bowels, from ſudden Accidents.*

THERE ſeems to be no diſtemper ſo little underſtood by the common farrier as the colic or gripes in horſes, one general remedy or method ſerving them in all caſes: but as this diſorder may be produced by very different cauſes, the method of cure muſt alſo vary; otherwiſe the intended remedy, injudiciouſly applied, will not only aggravate the complaint, but make it fatal. We ſhall divide this diſorder into three different ſpecies: the flatulent or windy, the bilious or inflammatory, and the dry gripes; each of which we ſhall diſtinguiſh by their different ſymptoms, and then point out the proper remedies.

1. The flatulent or windy colic may in general be readily diſtinguiſhed by the rumbling of the confined air through the inteſtines: The horſe is often lying down, and as ſuddenly riſing again with a ſpring; he ſtrikes his belly with his hinder feet, ſtamps with his fore-feet, and refuſes his meat; when the gripes are violent, he will have convulſive twitches, his eyes be turned up and his limbs ſtretched out as if dying, his ears and feet being alternately very hot and cold; he falls into profuſe ſweats, and then into cold damps; ſtrives often to ſtale, and turns his head frequently to his flanks; he then falls down, rolls about, and often turns on his back; this laſt ſymptom proceeds from a ſtoppage of urine, that almoſt always attends this ſort of colic, which may be increaſed by a load of dung preſſing on the neck of the bladder.

Theſe are the general ſymptoms of colic and gripes from wind, drinking cold water when hot, and when the perſpirable matter is retained, or thrown on the bowels by catching cold; in all which caſes they are violently diſtended. Cribbing horſes are more particularly ſubject to this complaint, by reaſon they are conſtantly ſucking in great quantities of air.

The firſt intention is to empty the ſtrait gut with a ſmall hand dipped in oil, which frequently makes way for the confined wind to diſcharge itſelf, and by eaſing the neck of the bladder, the ſuppreſſion of urine is taken off, and the horſe ſtales and gets eaſe.

The following ball and glyſter ſeldom fail of giving relief in theſe caſes.

TAKE Straſburgh or Venice turpentine, and juniper-berries pounded, of each half an ounce; ſalt-prunella or ſaltpetre, an ounce; oil of juniper, one dram; ſalt of tartar, two drams: Make into a ball with any ſyrup; it may be given whole, and waſhed down with a decoction of juniper berries, or a horn or two of ale.

If the horſe does not break wind, or ſtale plentifully, he will find no relief: therefore in an hour or two give him another ball, and add to it a dram of ſalt of amber; which may be repeated a third time, if found neceſſary. During the fit the horſe may be walked and trotted gently; but ſhould by no means be haraſſed beyond his ability, or dragged about till he is jaded.

The following glyſter may be given between the balls, or alone, and repeated occaſionally.

TAKE camomile flowers two handfuls; aniſe, coriander, and fennel ſeeds, of each an ounce; long pepper half an ounce; boil in three quarts of water to two; and add Daffy's elixir, or gin, half a pint; oil of amber half an ounce, and oil of camomile eight ounces.

The ſigns of a horſe's recovery, are his lying quiet, without ſtarting or tumbling, and his gathering up his legs, and ceaſing to laſh out; and if he continues an hour in this quiet poſture, you may conclude all danger over.

2. The next ſpecies of colic is the bilious or inflammatory. This, beſides moſt of the preceding ſymptoms, is attended with a fever, great heat, panting, and dryneſs of the mouth: the horſe alſo generally

Colic or Gripes, &c.

rally throws out a little looſe dung, with a hot ſcalding water, which, when it appears blackiſh, or of a reddiſh colour, and fetid ſmell, denotes an approaching mortification.

In this caſe the horſe ſhould immediately be bled to the quantity of three quarts; and it ſhould be repeated, if the ſymptoms do not abate in a few hours. The emollient glyſter, with two ounces of nitre diſſolved in it, ſhould be thrown up twice a-day, to cool the inflamed bowels; plenty of gum arabic water ſhould be taken; and a pint of the following drink given every two or three hours till ſeveral looſe ſtools are procured, and then it ſhould be given only night and morning till the diſorder is removed.

> Take ſenna three ounces, ſalt of tartar half an ounce; infuſe in a quart of boiling water an hour or two; then ſtrain off, and add two ounces of lenitive electuary, and four of Glauber's ſalts.

If this diſorder is not removed by theſe means, but the inflammation and fever increaſe, attended with a diſcharge of the fleſh-coloured water above deſcribed, the event will moſt probably be fatal; and the chief thing to be depended on now, muſt be a ſtrong decoction of Jeſuit's bark, given to the quantity of a pint every three hours, with a gill of red port-wine.

A quart of the ſame may be uſed for a glyſter, with two ounces of Venice turpentine, diſſolved with the yolks of two eggs, an ounce of diaſcordium, and a pint of red wine, and given twice a-day: if the horſe recovers, give two or three mild rhubarb purges.

3. The dry gripes, or colic which ariſes often from coſtiveneſs, is diſcovered by the horſe's frequent and fruitleſs motion to dung, the blackneſs and hardneſs of the dung, the frequent and quick motion of his tail, the high colour of his urine, and his great reſtleſſneſs and uneaſineſs.

In this caſe the ſtrait gut ſhould be examined and emptied with a ſmall hand oiled properly for that purpoſe; the emollient oily glyſter (p. 116. col. 2. par. 3.) ſhould be thrown up twice a-day; and the above purging drink given, till the bowels are unloaded, and the ſymptoms removed.

The diet for a horſe in the gripes ſhould be ſcalded bran, warm water-gruel, or white water, made by diſſolving four ounces of gum-arabic in a quart of water, and mixing it with his other water.

4. From this hiſtory and diviſion of gripes and colics, with their different treatment, it appears how abſolutely neceſſary it is they ſhould be well underſtood, in order to be managed ſkilfully: it is plain, too, that violent hot medicines ſhould in every ſpecies of this diſorder be guarded againſt, and given with great caution and diſcretion, even in the firſt kind of flatulent colic, where indeed they can only be wanted; yet too often, when prepared by the farriers with oil of turpentine, geneva, pepper, and brine, &c. they even increaſe that diſorder, by ſtimulating the neck of the bladder, too forcibly heating the blood, and inflaming the bowels, till a mortification is brought on them. Theſe are, in general, the conſtant appearances of horſes that die of this diſorder; whoſe bowels being examined for that purpoſe, have been found inflamed, full of red and livid ſpots, ſometimes quite black, criſped with extreme heat, and rotten.

Sect. XVIII. *Of the Lax and Scouring, with other Diſorders of the Stomach and Bowels.*

Lax and Scouring, &c.

It is ſometimes a nice matter to form a proper judgment when to controul or encourage a looſeneſs; but theſe general rules may be a direction: If a healthy full horſe, on taking cold, or upon hard riding, overfeeding, eating unwholeſome food, or with a ſlight fever, ſhould have a moderate purging, by no means think of ſtopping it; but rather encourage it with an open diet, and plenty of warm gruel: but if it continues long, with gripings, the mucus of the bowels coming away, and the horſe loſing his appetite and fleſh, recourſe muſt be had to proper medicines. If he voids great quantities of ſlime and greaſy matter, give him the following drench, and repeat it every other day for three times.

> Take lenitive electuary and cream of tartar of each four ounces, yellow roſin finely powdered one ounce, and four ounces of ſweet oil; mix with a pint of water-gruel.

The following alterative ball alone has been found ſucceſsful for this purpoſe when given twice a-week, with ſcalded bran and warm gruel.

> Take ſocotorine aloes half an ounce, diapente one ounce; make into a ball with the juice of Spaniſh liquorice diſſolved in water, and a ſpoonful of oil of amber. To this may be added two drams of myrrh, and a dram of ſaffron, and (where it can be afforded) half an ounce of rhubarb.

When the purging is attended with a fever, rhubarb ſhould firſt be given to the quantity of half an ounce, with an ounce and half of lenitive electuary; at night, after the working, give half an ounce or more of diaſcordium in a pint of red wine mulled with cinnamon; and repeat it every day, and the rhubarb-ball once in two or three.

But if the diſtemper increaſes, the horſe's flanks and belly look full and diſtended, and he appears griped and in pain, let this glyſter be given, and the quantity of diaſcordium increaſed an ounce in his night-drink.

> Take camomile flowers one handful, red roſes half a handful, pomegranate and balauſtines of each an ounce; boil in two quarts of water to one; ſtrain off, and diſſolve it in two or three ounces of diaſcordium and one of mithridate; to which may be added a pint of port wine. Repeat it once a-day.

If the flux continues violent, give an ounce of rock-alum, with an ounce and a half of bole, twice a-day; or, diſſolve double this quantity with two ounces of diaſcordium, and the cordial ball, in two quarts of hartſhorn drink; to which may be added a pint of port; and give the horſe, three or four times a-day, a pint of this drink. For this purpoſe alſo a ſtrong decoction of oak-bark may be given, with either of the above remedies, and to the ſame quantity; even by itſelf, it will be found on trial no inconſiderable remedy.

When the diſcharge is attended with an acrid mucus or ſlime, the griping and pains are very ſevere, the common lining of the bowels being waſhed away; in this caſe the following glyſter ſhould frequently be injected warm.

TAKE of tripe-liquor or thin ſtarch two quarts, oil of olives half a pint, the yolk of ſix eggs well broke, and two or three ounces of coarſe ſugar.

Some horſes, having naturally weak ſtomachs and bowels, throw out their aliment undigeſted; their dung is habitually ſoft and of a pale colour; they feed poorly, and get no fleſh: to remedy this complaint, give the following purge two or three times; and then the infuſion to the quantity of a pint every morning.

TAKE ſocotorine aloes ſix drams, rhubarb powdered three drams, myrrh and ſaffron each a dram; make into a ball with ſyrup of ginger.

Infuſion.—TAKE zedoary, gentian, winter's-bark, and orange-peel, of each two ounces; pomegranate-bark and balauſtines of each an ounce; camomile-flowers and centaury, each a handful; cinnamon and cloves, each an ounce; infuſe in a gallon of port or ſtrong beer.

The bloody-flux is a diſtemper horſes are not very ſubject to; however, as it ſometimes does occur, whenever blood is diſcharged, attended with gripings and great pain in the bowels, if the flux is not ſpeedily reſtrained the horſe probably may be ſoon loſt: we recommend therefore the following glyſter and drink for that purpoſe.

TAKE oak-bark four ounces, tormentil-root two ounces, burnt hartſhorn three ounces; boil in three quarts of forge-water to two; ſtrain off, and add two ounces of diaſcordium, four ounces of ſtarch, and half a dram of opium.

A glyſter may alſo be prepared with the ſame quantity of fat broth, ſtarch, and opium, in order to plaſter over the coats of the bowels, and abate their violent irritations. Alſo,

TAKE ſoft chalk two ounces, mithridate or diaſcordium one ounce, powder of Indian-root half a dram, liquid laudinum 50 or 60 drops; diſſolve in a pint of hartſhorn drink, and add to it four ounces of cinnamon-water and red wine; give it twice a-day.

Gum-arabic diſſolved in hartſhorn drink, or in common water, ſhould be the horſe's uſual drink.

When horſes are apt to be coſtive, from whatever cauſe it ariſes, gentle openers ſhould be given; ſuch as cream of tartar, Glauber's ſalts, and lenitive electuary; four ounces of any two of theſe diſſolved in warm ale, whey, or water, given every other morning for two or three times, will anſwer this purpoſe; eſpecially if aſſiſted by an oily emollient glyſter, prepared with a handful of ſalt. Scalded bran or barley, with an ounce of fenugreek and linſeed, occaſionally given, will prevent this complaint: but where it is conſtitutional, and proceeds from the power and force of digeſtion in the ſtomach and guts, as ſometimes happens, and the horſe is in perfect health, no inconvenience will ariſe from it; and it is obſerved that ſuch horſes are able to indure great fatigue and labour.

SECT. XIX. *Of Worms and Botts.*

AUTHORS have deſcribed three different ſorts of worms that affect horſes, *viz.* *Botts*, which young horſes are often troubled with in the ſpring; the *Rotundi*, or thoſe reſembling earth-worms; and the *Aſcarides*, or thoſe about the ſize of the largeſt ſewing needle, with flat heads.

The botts which breed in the ſtomachs of horſes, and are ſometimes the cauſe of convulſions, appear to be very large maggots, compoſed of circular rings, with little ſharp prickly feet along the ſides of their bellies (like the feet of hog-lice), which by their ſharpneſs (like the points of the fineſt needles) ſeem to be of uſe to faſten them to the part where they breed and draw their nouriſhment, and to prevent their being looſened from ſuch adheſion before they come to maturity. The eggs from whence thoſe botts are produced, are diſperſed into cluſters all round the lower orifice of the ſtomach, and are laid under the inner coat or thin membrane of the ſtomach; ſo that when the animals come to form and life, they burſt through this inner coat with their breech and tail ſtraight outwards, and their trunks ſo fixed into the muſcular or fleſhy coat of the ſtomach, that it ſometimes requires a good pull to diſengage them: from the blood of this laſt coat they draw their nouriſhment, which they ſuck like ſo many leeches, every one ulcerating and purſing up the part where it fixes like a honey-comb; and they often make ſuch quick havock as to deſtroy the horſe.

The ſymptoms of worms are various. The botts that many horſes are troubled with in the beginning of ſummer, are always ſeen ſticking on the ſtrait gut, and are often thruſt out with the dung, with a yellowiſh coloured matter like melted ſulphur: they are no ways dangerous there; but are apt to make a horſe reſtleſs and uneaſy, and rub his breech againſt the poſts. The ſeaſon of their coming is uſually in the months of May and June; after which they are ſeldom to be ſeen, and rarely continue in any one horſe above a fortnight or three weeks. Thoſe that take their lodgment in the ſtomach, are extremely dangerous by cauſing convulſions; and are ſeldom diſcovered by any previous ſigns before they come to life, when they throw a horſe into violent agonies. The other kinds are more troubleſome than dangerous; but are known by the following ſigns: the horſe looks lean and jaded, his hair ſtares as if he was ſurfeited, and nothing he eats makes him thrive; he often ſtrikes his hind-feet againſt his belly; is ſometimes griped, but without the violent ſymptoms that attend a cholic and ſtrangury; for he never rolls and tumbles, but only ſhows uneaſineſs, and generally lays himſelf down quietly on his belly for a little while, and then gets up and falls a feeding; but the ſureſt ſign is when he voids them with his dung.

For the cure of botts in the ſtomach, calomel ſhould firſt be given in large quantities, and repeated at proper intervals; Æthiop's mineral, or ſome of the undermentioned forms, many be given afterwards.

But botts in the ſtrait gut may be cured by giving the horſe a ſpoonful of ſavin, cut very ſmall, once or twice a-day in his oats or bran, moiſtened; and three or four cloves of garlic may be added to advantage. Give alſo an aloetic purge between whiles; the following ſtands recommended.

TAKE fine ſocotorine aloes, ten drams; freſh jalap, one dram; ariſtolochia, or birthwort, and myrrh powdered, of each two drams; oil of ſavin and

Yellows, or Jaundice.

amber, of each one dram ; ſyrup of buckthorn enough to form into a ball.

But as the ſource of worms in general proceeds from a vitiated appetite and a weak digeſtion, recourſe muſt firſt be had to mercurials, and afterwards to ſuch things as are proper to ſtrengthen the ſtomach, promote digeſtion, and by deſtroying the ſuppoſed ova, prevent the regeneration of theſe animals. Thus, two drams of calomel may be given with half an ounce of diapente, and mixed up with conſerve of wormwood, overnight ; and the next morning the above purge : theſe may be repeated ſix or eight days. Or the following mercurial purge may be given, which will be leſs troubleſome, and no leſs efficacious.

TAKE crude quickſilver two drams, Venice turpentine half an ounce ; rub the quickſilver till no gliſtening appears ; then add an ounce of aloes, a dram of grated ginger, 30 drops of oil of ſavin, and a ſufficient quantity of ſyrup of buckthorn to make a ball.

One of theſe balls may be given every ſix days, with the uſual precautions in regard to mercurial phyſic ; and the following powder intermediately.

TAKE powdered tin and Æthiop's mineral of each half an ounce : give every night in a maſh, or among his corn.

The various preparations of antimony and mercury muſt be given ſeveral weeks together, in order to get entire riddance of theſe vermin. The Æthiop's mineral may be given to the quantity of half an ounce a-day ; the mercurius alkaliſatus to two drams a-day, incorporated with a bit of cordial ball. The cinnabar powders, as directed in the farcy, are no leſs effectual : and when worms are bred from high feeding, or unwholeſome food ; rue, garlic, tanſy, ſavin, box, and many other ſimples, may be given ſucceſsfully ; being for that purpoſe mixed with their food ; as alſo cut tobacco, from half an ounce to an ounce a-day.

SECT. XX. *Of the Yellows, or Jaundice.*

HORSES are frequently ſubject to this diſtemper ; which is known by a duſky yellowneſs of the eyes ; the inſide of the mouth and lips, the tongue, and bars of the roof of the mouth, looking alſo yellow. The horſe is dull, and refuſes all manner of food ; the fever is ſlow, yet both that and the yellowneſs increaſe together. The dung is often hard and dry, of a pale yellow, or light pale green. His urine is commonly of a dark dirty brown colour ; and when it has ſettled ſome time on the pavement, it looks red like blood. He ſtales with ſome pain and difficulty ; and if the diſtemper is not checked ſoon, grows delirious and frantic. The off-ſide of the belly is ſometimes hard and diſtended ; and in old horſes, when the liver has been long diſeaſed, the cure is not practicable, and ends fatally with a waſting diarrhœa : but when the diſtemper is recent, and in young horſes, there is no fear of a recovery, if the following directions are obſerved.

Firſt of all bleed plentifully ; and give the laxative glyſter (p. 120. col. 2. laſt par.) as horſes are apt to be very coſtive in this diſtemper ; and the next day give him this purge :

TAKE of Indian rhubarb powdered one ounce and a half, ſaffron two drams, ſocotorine aloes ſix drams, ſyrup of buckthorn a ſufficient quantity.

Diſorders of the Kidneys, &c.

If the rhubarb ſhould be found too expenſive, omit it, and add the ſame quantity of cream of tartar, and half an ounce of caſtile ſoap, with four drams more of aloes. This may be repeated two or three times, giving intermediately the following balls and drink.

TAKE of Æthiop's mineral half an ounce, millepedes the ſame quantity, caſtile ſoap one ounce ; make into a ball, and give one every day, and waſh it down with a pint of the following decoction.

TAKE madder root and turmerick of each four ounces, burdock-root ſliced half a pound, Monk's rhubarb four ounces, liquorice ſliced two ounces ; boil in a gallon of forge-water to three quarts ; ſtrain off, and ſweeten with honey.

Balls of caſtile ſoap and turmerick may be given alſo for this purpoſe to the quantity of three or four ounces a-day, and will in moſt recent caſes ſucceed.

By theſe means the diſtemper generally abates in a week, which may be diſcovered by an alteration in the horſe's eyes and mouth ; but the medicines muſt be continued till the yellowneſs is entirely removed.

Should the diſtemper prove obſtinate, and not ſubmit to this treatment, you muſt try more potent remedies, viz. mercurial phyſic, repeated two or three times at proper intervals ; and then the following balls.

TAKE ſalt of tartar two ounces, cinnabar of antimony four ounces, live millepedes and filings of ſteel of each three ounces, ſaffron half an ounce, Caſtile or Venice ſoap half a pound ; make into balls, the ſize of a pullet's egg, with honey ; and give one night and morning, with a pint of the above drink.

It will be proper, on his recovery, to give two or three mild purges ; and, if a fat full horſe, to put in a rowel.

SECT. XXI. *Of the Diſorders of the Kidneys and Bladder.*

THE ſigns of the kidneys being hurt or affected are, a weakneſs of the back and loins, difficulty of ſtaling, faintneſs, loſs of appetite, and deadneſs in the eyes ; the urine is thick, foul, and ſometimes bloody, eſpecially after a violent ſtrain. A horſe diſeaſed in his kidneys can ſeldom *back*, that is, move ſtraight backwards, without pain, which is viſible as often as he is put to the trial ; the ſame thing is obſervable indeed in horſes whoſe backs have been wrung and wrenched ; but with this difference, that in the latter there is ſeldom any defect or alteration in the urine, except that it is higher coloured.

The conſequences of a diſordered ſtate of the urinary organs are principally two ; ſtranguary and diabetes.

1. *Strangury*, or an obſtruction of urine, may ariſe from different cauſes. When it is not owing to wind, or hardened dung preſſing upon the neck of the bladder (as was obſerved in the ſection on *Cholics*), it may proceed from inflammation in the bladder or kidneys, ulcerations there, or ſpaſms upon any particular part. When owing to inflammation or ſpaſm, the general indications of cure are, to leſſen the ſtricture upon the parts ; to reduce the inflammation ; and to promote the evacuation of urine : the firſt of which intentions may be anſwered by a moderate loſs of blood ; the ſecond,

cond, by the uſe of internal emollients; and the third, by gentle ſtimulants and mild diuretics.

In ſtrangury from inflammation or ſpaſm in the parts, the horſe makes frequent motions to ſtale, ſtands wide and ſtraddling, appears full in the flank, and ſomewhat dejected. The firſt meaſure, as already obſerved, is bleeding; and that more or leſs plentifully according to the urgency of the ſymptoms. In a convenient time after this operation, Mr Taplin recommends to throw up the following emollient glyſter:

Stable Directory, p. 363.

"Take of thin gruel three pints, nitre two ounces, gum arabic one ounce and an half, olive oil four ounces; let it be injected moderately warm, and retained in the body as long as poſſible.

"So ſoon after this glyſter as the horſe is inclined by appetite to receive it, give a maſh of two parts malt and one bran, they having been ſcalded together and ſtirred till of a moderate warmth; after this, if the ſubject has not ſtaled in conſequence of bleeding, glyſter, and maſh, have the following balls expeditiouſly prepared to forward the evacuation:

"Take caſtile ſoap ten drams, ſal prunella one ounce, camphire two drams, anniſeed powder ſix drams, oil of juniper one dram and an half, ſyrup of marſhmallows ſufficient to make the maſh; which divide into two equal parts, giving one in ſix hours after the other, if the former is not ſucceſsful.

"Theſe are very ſafe, mild, and efficacious, in general producing the deſired effect without any uneaſy ſenſations. Where a drink is preferred, as coming into a more applicable mode of adminiſtration, the following will prove equally ſerviceable:

"Take juniper berries (bruiſed) two ounces; boil in a pint and a half of water for ſome time, then ſtrain (to produce by ſqueezing the berries three quarters of a pint); to this add nitre and gum Arabic (in powder) each an ounce.

"This drink, or the above ball, to be repeated at diſtinct periods of four hours each (if a repetition of the firſt at the end of ſix hours does not effect the deſired purpoſe), till relief is obtained by plentiful evacuation."

As a ſuppreſſion of urine ariſes ſometimes from an inflammation of the parts; ſo at others from a paralytic affection, particularly of the kidneys, diſabling them in their office of ſeparating the urine from the blood: in this latter caſe, a general ſuppreſſion taking place, the bladder is uſually empty, ſo that a horſe will make no motion to ſtale; and if he ſurvives a few days in this condition, his body will ſwell to a great degree, break out in blotches all over, and death will ſoon cloſe the ſcene.

Strangury ſometimes alſo ariſes from an ulceration of the parts; which is a caſe almoſt as deſperate as the preceding. The ſymptoms are: A viſible diſquietude; the evacuation not totally ſuppreſſed, being only at times obſtructed; the urine frequently altering its appearance, being ſometimes thick, depoſiting a turbid ſediment as if impregnated with membranous matter; and at other times tinged with blood, the evident effect of a corroded ſolution of the diſeaſed part. In this inſtance the following balls or drink are recommended by Mr Taplin as the only probable means of relief.

Ibid. p. 368.

"Take of myrrh one ounce, Caſtile ſoap and Locatelli's balſam each three ounces, nitre and aniſeed (in powder) each two ounces, balſam of Peru ſix drams. Mix together with ſyrup of marſhmallows, and divide into ſix balls, giving one every morning.

"In caſe ſpaſm of the parts be alſo ſuſpected, the following ball may be given, and repeated at ſuch times as the circumſtances of the caſe may render proper.

Ibid. p. 369.

"Take of Caſtile ſoap half an ounce; nitre, roſin, and compound powder of gum tragacanth, each two drams; opium (in powder) ten grains; oil of juniper 30 drops.—Mix.

"The following drink may be ſubſtituted with equal effect if a liquid form is preferred:

"Take thin gruel three quarters of a pint, gum Arabic and nitre (in powder) each one ounce, liquid laudanum three drams.—Mix.

"This (as the ball above) may be occaſionally repeated."

2. Horſes ſubject to a *diabetes*, or profuſe ſtaling, if old, or of a weak conſtitution, are ſeldom cured; they ſoon loſe their fleſh and appetite, grow feeble, their coat ſtaring, and they die rotten. Of a young horſe there are more hopes: but he muſt not be indulged with too much water or moiſt food. Give him the following:

Take jeſuits bark four ounces, biſtort and tormentil-root of each two ounces; boil in two gallons of lime-water to the conſumption of half, and give a pint three times a-day.

As this diſorder generally proceeds from too violent exerciſe, over-ſtraining, &c. repeated bleedings in ſmall quantities are abſolutely neceſſary, till the mouths of the veſſels cloſe up.

Sect. XXII. *Of Molten-greaſe.*

By molten-greaſe is meant a fat or oily diſcharge with the dung; and it ariſes from a colliquation or melting down of the fat of a horſe's body by violent exerciſe in very hot weather. It is always attended with a fever, heat, reſtleſſneſs ſtarting and tremblings, great inward ſickneſs, ſhortneſs of breath, and ſometimes with the ſymptoms of a pleuriſy. His dung will be extremely greaſy, and he will fall into a ſcouring; his blood will have a thick ſkin or fat over it when cold, of a white or yellow hue, but chiefly the latter; the congealed part or ſediment is commonly a mixture of ſize and greaſe, which makes it ſo extremely ſlippery, that it will not adhere to the fingers, and the ſmall portion of ſerum feels alſo ſlippery and clammy. The horſe ſoon loſes his fleſh and fat, which probably is diſſolved and abſorbed into the blood; and thoſe that ſurvive this ſhock commonly grow hide-bound for a time, their legs ſwelling both before and behind, and continue in this ſtate till the blood and juices are rectified; and if this is not done effectually, the farcy or ſome obſtinate ſurfeit generally follows, very difficult to remove.

In the firſt place bleed plentifully, and repeat it for two or three days ſucceſſively in ſmaller quantities; two or three rowels ſhould alſo be immediately put in, and the cooling emollient glyſters (p. 121. col. 1. par. 1, 2.) daily thrown up to abate the fever, and drain off the greaſy matter from the inteſtines. By the mouth give plenty of warm water or gruel, with cream of tartar, or nitre, to dilute and attenuate the blood, which in this caſe is greatly diſpoſed to run into grumes, and in danger a total ſtagnation.

When the fever is quite gone off, and the horſe has recovered his appetite, gentle aloetic purges ſhould be given once a-week, for a month or ſix weeks, in order to bring down the ſwelled legs. To this end give the following; which, repeated for ſome time, will entirely remove this diſorder.

Take of ſocotorine aloes ſix drams, of gum guaiacum powdered half an ounce, of diaphoretic antimony and powder of myrrh each two drams; make into a ball with ſyrup of buckthorn.

Theſe will ſeldom take a horſe from his buſineſs above two or three days in a week; neither will he loſe his fleſh or appetite with them, but on the contrary mend in both; which cannot be obtained by any other method of purging, and gives this greatly the preference in many caſes.

Sect. XXIII. *Of Hide-bound, Surfeits, and Mange.*

1. The ſigns of *Hide-bound* are, "a want of flexibility in the ſkin, which is pervaded by a general ſtiffneſs that ſeems to form an entire adheſion to the fleſh, without the leaſt partial ſeparation or diſtinction. There is a kind of duſty ſcurff, plainly perceived underneath the hair, that raiſes it up in different parts; and, giving it another hue, the coat in many places forms an appearance of two or three colours; conveying, even in this trifling circumſtance, a very forcible idea of poverty in both food and raiment. The horſe is generally languid, dull, heavy, and weak: his excrement is dark, foul, and offenſive; he ſweats much upon very moderate exertions; then his coat ſtares, the hair turns different ways (which in its effluvia is diſagreeable), and affords evident proof of weakneſs and debilitation.

Stable Directory, p. 114.

Bad food and want of ſtable care are, in general, the only probable reaſons that can be aſſigned for this complaint. Long lank graſs in low ſwampy land in autumn, and muſty hay or bad oats at any ſeaſon, may in ſome degree allay the hunger, but not gratify the appetite; for, being in itſelf deſtitue of the effect and quality of ſuperior food, no nutritive contribution can be conveyed for the generating of blood or formation of fleſh. The ſources for the ſupply of chyle being thus obſtructed, the lymphatics are deprived of their due proportion of nutritive fluid that ſhould paſs through theſe ſmaller veſſels; and they become not only in ſome meaſure contracted, but in a great degree inactive, which, with the want of proper external care and dreſſing, contribute to an almoſt univerſal obſtruction of the cutaneous pores. Theſe, from the preternatural debilitation of the general ſyſtem, are thrown open by the moſt moderate exerciſe.

In reſpect to its cure very few directions will be neceſſary, the caſe being no more than a temporary inconvenience, rather than a diſeaſe. Therefore, by way of affording ſome little change to the circulation, take away a ſmall quantity of blood; and in three or four hours after, increaſe its *impetus* by a maſh of malt, oats, and bran, equal parts. Continue this maſh every night for a fortnight, ſtirring in two ounces of flower of brimſtone every other night; and for his other feeds (morning and noon) give equal parts of oats and bran, with half a pint of old beans in each, to prevent relaxing the body too much by the maſhes. At the ſame time, regular and ſubſtantial dreſſing, air, exerciſe, ſound oats, ſweet hay, and good ſoft water, will greatly contribute to promote the cure. And when by theſe means he has viſibly improved in hide, coat, and condition, let him have twice in a week a bruſhing gallop, to produce a moderate ſweat and promote the circulation; taking great care not to let him ſtand ſtill till he is perfectly cool; when his dreſſings ſhould be thoroughly gone through with attention, care, and perſeverance, every night and morning. If this method ſhould be unattended with ſucceſs, there will be reaſon to ſuſpect ſome unknown cauſe lurking behind; in which caſe go through a mild courſe of phyſic, feeding well between the doſes.

2. Of *Surfeits*, according to Mr Taplin, there are two kinds, originating from different cauſes: One being no more than a very advanced ſtage of the caſe laſt deſcribed; which being long neglected, all its ſymptoms increaſe, till the entire maſs of blood being at laſt affected, the virulence of the diſorder diſplays itſelf upon the ſurface of the body.

The other kind of ſurfeit, differing from the former in cauſe, but very little in effect, is that where, from ignorance or inattention, a horſe is ſuffered to drink immoderately of cold water, when in a violent perſpiration, and the blood conſequently in the higheſt degree of circulation.

The circulating fluid being ſo inſtantaneouſly checked by the influence of the frigid element and the ſudden contraction of the ſolids, the craſſamentum becomes immediately thickened and inflamed; while the ſerum or watery part, ſeparating from the other, extravaſates itſelf; and, by an effort of nature, is propelled to the ſkin for tranſpiration, where the pores (having been inſtantly collapſed at the time of the water's taking effect) are ſo cloſely obſtructed that its paſſage to the ſurface is rendered impracticable. In this ſituation it becomes united with the perſpirable matter already confined there; and is, in the courſe of time, compelled by the progreſs of internal inflammation to make its way through the ſkin; upon which it at laſt appears in a variety of forms and different ſymptoms, aſſuming diſtinct degrees of malignancy, according to the ſtate, habit, and conſtitution of the ſubject at the time of attack.

Such, in ſubſtance, is Mr Taplin's account of this diſorder. The indications of cure are, To reſolve the inflammatory crudities, remove cutaneous obſtruction, correct the acrimony of the blood, and gently quicken the circulation. The better to effect theſe, he directs to take away a moderate quantity of blood, that the impetus may be encouraged; to open the body with a few warm maſhes; and according to the mildneſs or in-

Hide-bound, Surfeits, &c.

inveteracy of its appearance, to give either two or three mercurial purges, compoſed of the following ingredients.

Barbadoes aloes one ounce, jalap (in powder) three drams; calomel, cream of tartar, Caſtile ſoap, and ginger (in powder) of each two drams; with ſyrup of buckthorn ſufficient to make a ball.

The doſes muſt be given at proper intervals; particular care being all the while taken to guard againſt cold on account of the mercury contained in the compoſition. In three days after the laſt doſe, a courſe of alteratives muſt be entered upon, the medicine compoſed as follows.

Antimony levigated and ſulphur each half a pound, Æthiop's mineral and cream of tartar each four ounces. Theſe are to be mixed well together, and divided into twelve equal parts of two ounces each; for twelve doſes; one of which muſt be given every night with the feed of corn; the latter being firſt ſprinkled with water, the better to retain the powders.

Theſe muſt be continued with the utmoſt punctuality for a month; during all which time let there be alſo given two ounces of nitre every morning in a pail of ſoft water. Should any trifling eſchars, ſcabs, or excoriations, prove obſtinate upon any part of the body, they may be waſhed with equal parts of lye (procured from the ſoap boilers) and lime-waters.

If in the courſe of a month no conſiderable advantage ſhould be produced by the above preſcriptions, the doſes muſt be gradually increaſed from two ounces to two and an half, and in another week to three ounces for each doſe, of both the compoſition and the nitre.

3. *Mange* is a diſtemper ſo univerſally known as to render a particular deſcription unneceſſary. It proceeds chiefly from poor feeding: hence it is very little ſeen amongſt horſes of any eſtimation; but is almoſt entirely confined to the lower claſs of ſtables and proprietors.

In a mangy horſe the ſkin is generally tawny, thick, and full of wrinkles, eſpecially about the mane, the loins, and tail; and the little hair that remains in thoſe parts ſtands almoſt always ſtraight out or briſtly; the ears are commonly naked and without hair, the eye and eye-brows the ſame; and when it affects the limbs, it gives them the ſame aſpect: yet the ſkin is not raw, nor peels off, as in the ſurfeit.

Where this diſtemper is caught by infection, if taken in time it is very eaſily cured: and a ſulphur ointment is recommended as moſt effectual for that purpoſe, rubbed in every day. To purify and cleanſe the blood, give antimony and ſulphur for ſome weeks after. There are a great variety of external remedies for this purpoſe, ſuch as train-oil and gunpowder, tobacco ſteeped in chamber lye, &c. moſt of them evidently improper. Soleſeyl recommends the following, which has been approved.

Take burnt alum and borax in fine powder of each two ounces, white vitriol and verdigris powdered of each four ounces; put them into a clean pot, with two pounds of honey, ſtirring till they are incorporated; when cold, add two ounces of ſtrong aquafortis.

But when this diſorder, as is generally the caſe, is contracted by low feeding and poverty of blood, the diet muſt be mended, and the horſe properly indulged with hay and corn. With this view, there muſt be a conſtant ſupply of warm maſhes, prepared with half malt and half bran, or equal parts of oats and bran, with four ounces of honey diſſolved in each: let theſe be given night and morning, with a feed of dry corn every day at noon. During this treatment (which muſt be continued a week, to ſheathe the acrimony of the fluids, and ſoften the rigidity of the ſkin) give one ounce of ſulphur in each maſh, and one ounce of nitre in water every night and morning. In a week or ten days, when the frame becomes more invigorated, diſcontinue the maſhes, and let the diet be changed to good oats and ſweet hay; giving, in the morning and evening feeds, one of the following powders, intermixed with the corn firſt ſprinkled with water:

Sulphur and prepared antimony each a pound, rubbed well together in a mortar, and then divided into 24 equal parts for as many doſes.

Or, Antimony levigated and ſulphur of each 12 ounces, liver of antimony and cream of tartar each half a pound.—Theſe to be mixed well together, and divided into the ſame number of doſes as the former.

As to the external treatment; previous to the commencement of the maſhes, procure a pail of warm water and a quarter of a pound of ſoft ſoap (tied up in a linen rag), and with this forming a ſtrong lather, let every infected part be thoroughly waſhed and cleanſed, ſo that no ſcurf or filth be left upon the ſurface; then rub tenderly, dry with a coarſe cloth or ſeparated haybands; and on the following morning begin to rub in upon every part affected a due portion of the following ointment.

Weak mercurial ointment half a pound, quickſilver four ounces, white hellebore (in powder) three ounces, black pepper (in powder) and oil of tartar each one ounce; with olive oil ſufficient to make it of a proper ſoftneſs.

The unction muſt be repeated for ſeven days, ten days, or a fortnight, according to the urgency of the ſymptoms; and let the powders before mentioned, with the nitre alſo, be continued for three weeks or a month. Laſtly, as ſoon as the horſe appears in a condition to bear it, take away a moderate quantity of blood, and give him afterwards two very mild doſes of phyſic.

Sect. XXIV. *Of the Farcin or Farcy.*

The true farcy is properly a diſorder of the blood-veſſels and their contained fluid; by which, when inveterate, the coats and integuments are ſo thickened that they become like ſo many cords.

At firſt, one or more ſmall ſwellings, or round buds like grapes or berries, ſpring out over the veins, and are often exquiſitely painful to the touch; in the beginning they are hard, but ſoon turn into ſoft bliſters, which when broke diſcharge an oily or bloody ichor, and turn into very foul and ill-diſpoſed ulcers. In ſome horſes it appears on the head only; in ſome on the external jugular; in others on the plate-vein, and runs downwards on the inſide of the fore-arm towards the knee, and very often upwards towards the briſket: in ſome the farcy ſhows itſelf on the hind-parts, about the paſterns, and along the large veins on the inſide of the thigh, riſing upwards into the groin, and towards the ſheath; and ſometimes it makes its appearance on the flanks, and ſpreads by degrees towards the lower belly, where it often becomes very troubleſome.

When the farcy appears on the head only, it is eaſily cured; eſpecially when it is ſeated in the cheeks and fore-head, the blood-veſſels being here ſmall: but it is more difficult when it affects the lips, the noſtrils, the eyes, the kernels under the jaws, and other ſoft and looſe parts, eſpecially if the neck-vein becomes corded. When it begins on the outſide of the ſhoulder or hips, the cure is ſeldom difficult; but when the farcy ariſes on the plate-vein, and that vein ſwells much, and turns corded, and the glands or kernel under the arm-pit are affected, it is hard to cure; but more ſo when the crural veins within ſide of the thigh are corded, and beſet with buds, which affects the kernels of the groin and the cavernous body of the yard. When the farcy begins on the paſterns or lower limbs, it often becomes very uncertain, unleſs a timely ſtop is put to it; for the ſwelling in thoſe dependent parts grow ſo exceſſively large in ſome conſtitutions, and the limbs ſo much disfigured thereby with foul ſores and callous ulcerations, that ſuch a horſe is ſeldom fit for any thing afterwards but the meaneſt drudgery; but it is always a promiſing ſign, wherever the farcy happens to be ſituated, if it ſpreads no further. It is uſual to affect only one ſide at a time; but when it paſſes over to the other, it ſhows great malignancy: when it ariſes on the ſpines, it is then for the moſt part dangerous; and is always more ſo to horſes that are fat and full of blood, than to thoſe that are in a more moderate caſe. When the farcy is epidemical, as ſometimes happens, it riſes on ſeveral parts of the body at once, forms naſty foul ulcers, and makes a profuſe running of greeniſh bloody matter from both noſtrils; and ſoon ends in a miſerable rot.

When the farcy makes its firſt appearance on the head, it riſes on the cheeks and temples, and looks like a net-work, or ſmall creeping twigs full of berries. Sometimes it inflames the eye, and ſometimes little bliſters or buds run along the ſide of the noſe. It ariſes often on the outſide of the ſhoulder, running along the ſmall veins with heat and inflammation; and ſometimes a few ſmall buds appear near the withers, and on the outſide of the hips. In all theſe appearances, the diſeaſe being ſuperficial, and affecting only the ſmaller veſſels, is eaſily conquered by the following method, when taken in time; for the ſimpleſt farcy, if neglected, may degenerate into the worſt ſort.

This diſtemper, then, being of an inflammatory nature, and in a particular manner affecting the blood-veſſels, muſt neceſſarily require large bleeding, particularly where the horſe happens to be fat and full of blood. This always checks the beginning of a farcy, but is of ſmall ſervice afterwards; and if a horſe is low in fleſh, the loſs of too much blood ſometimes proves injurious. After bleeding, let the horſe have four ounces of cream of tartar and lenitive electuary; which may be given every other day for a week, to cool the blood and the body; and then give nitre three ounces a-day for three weeks or a month, and anoint the buds or ſwellings with the following ointment twice a-day.

Take ointment of elder four ounces, oil of turpentine two ounces, ſugar of lead half an ounce, white vitriol powdered two drams; mix together in a gally-pot.

The buds ſometimes by this method are diſperſed, leaving only little bald ſpots which the hair ſoon covers again. When they break and run, if the matter be thick and well digeſted, they will ſoon be well: but in order to confirm the cure, and to diſperſe ſome little lumps which often remain for ſome time on the ſkin without hair, give the liver of antimony for a month; two ounces a-day for a fortnight, and then one ounce a-day for the other fortnight: by following this method, a farcy which affects only the ſmall veſſels may be ſtopped in a week or ten days, and ſoon after totally eradicated.

When the farcin affects the larger blood-veſſels, the cure is more difficult; but let it always be attempted early; therefore, on the plate, thigh, or neck-veins appearing corded, bleed immediately on the oppoſite ſide, and apply the following to the corded vein.

Take oil of turpentine in a pint-bottle ſix ounces, oil of vitriol three ounces; drop the oil of vitriol into the oil of turpentine by little at a time, otherwiſe the bottle will burſt; when it has done ſmoaking, drop in more oil of vitriol, and ſo on till all is mixed.

This mixture is one of the beſt univerſals in a beginning farcy; but where it is ſeated in looſe fleſhy parts, as flanks or belly, equal parts of the oil of vitriol and turpentine are neceſſary.

Rub the parts firſt with a woollen cloth, and then apply ſome of the mixture over the buds, and whereever there is any ſwelling, twice a-day. Give the cooling phyſic every other day, and then three ounces of nitre every day for ſome time.

When the farcy begins on the flanks, or towards the lower belly, it often takes its riſe from a ſingle puncture of a ſharp ſpur. The pain and ſmarting is one ſure ſign to diſtinguiſh the farcy from common accidents; the ſtaring of the hair, which ſtands up like a tuft all round the buds or bliſters, and the matter that iſſues from the buds, which is always purulent and of a clammy greaſy conſiſtence, are other certain ſigns. After bathing with the mixture abovementioned till the ulcers are ſmooth and healing, ſhould the ſwelling not ſubſide, to prevent the ſpreading of the buds, and to diſperſe them, bathe with either of theſe mixtures as far as the centre of the belly; and at the ſame time give a courſe of antimonials as will preſently be preſcribed.

Take ſpirits of wine four ounces, oil of vitriol and turpentine of each two ounces, white-wine vinegar or verjuice ſix ounces.

Or the following:

Take ſpirits of wine rectified four ounces, camphor half an ounce, vinegar or verjuice ſix ounces, white vitriol diſſolved in four ounces of ſpring-water one ounce, mix together.

In the lower limbs the farcy lies ſometimes concealed for a great while; and makes ſo flow a progreſs, that it is often miſtaken for greaſe, or for a blow or kick, and goes by the general appellation of *a humour ſettled there.* In order to diſtinguiſh the one from the other, we ſhall obſerve, that a kick or bruiſe is generally attended with a ſudden ſwelling, or a contuſed wound, Farcin or Farcy.

wound, which for the moſt part digeſts eaſily: the greaſe is alſo a ſmooth ſwelling that breaks out above the bending of the paſterns backwards; but the farcy begins on the paſtern joint uſually with one bud, and runs upwards like a knotty crab-tree.

Very ſimple means have ſometimes ſtopped it, before it has begun to ſpread; a poultice with bran and verjuice bound round the part and renewed once a-day will often alone ſucceed; and if proud fleſh ſhould ariſe, touch it with oil of vitriol, or aquafortis, an hour before you apply the poultice; for when the diſtemper is local, as we ſuppoſe it here, it is to be conquered by outward applications.

The following balls are proper in every ſtate of the farcy; and when the diſtemper has been in its infancy, before the ſkin was much defaced, has often cured it in a week or two, by giving them only once or twice a-day: but in an old farcy they ſhould be given for two or three months together.

> TAKE of native cinnabar, or cinnabar of antimony, eight ounces; long bithwort and gum guaiacum powdered, of each four ounces: make into a paſte with honey, and form into balls of the ſize of a large walnut, and roll them into liquorice-powder.

The tedious neſs of this courſe has encouraged the giving of mercurials; and indeed, where they are directed with ſkill, they muſt be attended with ſucceſs: the ſtronger preparations, as the red and white precipitates, and turbith, being combined with ſharp ſaline parts, may be hazardous and injurious; but the latter given in ſmall quantities have been found very ſucceſsful in ſuch kind of inveterate diſorders. Mr Gibſon ſays, he has given it to a dram at a doſe, where the limbs have been greatly ſwelled; that in 48 hours the ſores were all dried up, and the limbs reduced: but that it made the horſe ſo violently ſick for ſeveral days, and ſcoured him to ſuch a degree, that it could not be repeated.

Mr Bartlet obſerves, that the ſucceſs attending this medicine ſo ſuddenly ought to have encouraged Gibſon to have made further trials in ſmaller quantities; which had he done, it is more than probable he would not have been diſappointed; for the grand ſecret in giving mercurials as alteratives, is the introducing them into the blood, without operating on the ſtomach and bowels; and to do this effectually, they muſt be given in ſmall quantities, and ſo bridled as to controul their force on the firſt paſſages; taken in this manner, they will mix gradually with the blood and juices, and operate both effectually and ſafely.

Dr Braken recommends the knots and cords to be rubbed with the mercurial ointment before they break, in order to diſperſe them; and after breaking, to dreſs the ſores with equal parts of Venice turpentine and quickſilver; if by theſe means the mouth ſhould become ſore, treat as above. This method ſeems to be effectual, with proper care.

The following is alſo recommended by the ſame gentleman:

> TAKE butter of antimony and bezoar mineral, of each one ounce; beat up with half a pound of cordial ball; and give the bigneſs of a walnut, or three quarters of an ounce, every day for two or three weeks, faſting two or three hours after it.

The following mode of treatment and forms of medicine are preſcribed by Mr Taplin †.

Upon the very earlieſt appearance of the diſorder, blood is to be taken away in ſufficient quantity. If the horſe is in high condition and full of fleſh, give him maſhes through the day of bleeding and the next day; and on the following morning a purging ball compoſed of ſocotorine aloes ten drams, calomel and jalap (in powder) each two drams and a half, rhubarb and ginger of each a dram and a half, with ſyrup of buckthorn or roſes ſufficient to form the ball. Let the purge be carefully attended to, and duly worked off. If the phyſic works favourably, and ſets well, let his feed (if his appetite is keen for four clear days be plentiful, and on the fifth or ſixth at fartheſt repeat his purging ball. If the attack has been violent, or the diſorder makes rapid progreſs, a third doſe muſt be given in like manner. In two days after the courſe is completed, it is directed to begin upon the following antimonial alteratives, aſſiſted by a regular adminiſtration of nitre; both to be continued a month without the moſt trifling intermiſſion:

> PREPARED antimony one pound, common ſulphur twelve ounces, cream of tartar eight ounces, and cinnabar of antimony ſix ounces:

Which being incorporated well in a mortar, is to be divided into twenty equal parts. Of theſe, one is to be given every night in the corn, firſt ſprinkling with water to enſure its adheſion, and two ounces of nitre are to be mixed with the water every morning, at which time he will generally drink it with the greater avidity as being moſt thirſty. The buds or ſwelling upon their firſt appearance may be well waſhed with the following twice every day, with a lotion compoſed of extract of Saturn two ounces, camphorated ſpirit of wine eight ounces, and diſtilled vinegar a pint; mixed well together, and kept cloſe ſtopt for uſe.

In a more advanced or inveterate ſtage of the diſtemper, moderate bleeding ſhould be repeated at proper intervals between the phyſic; and upon the ſcabs or eſchars peeling from the buds, waſh them well occaſionally with the following:

> To two drams of corroſive mercury diſſolved in half a pint of Britiſh brandy, add a pint of white-wine vinegar, half a pint of ſpring water, and two ounces of tincture of myrrh; ſhaking well together.
>
> Or, Sugar of lead and white vitriol each an ounce, diſtilled vinegar and ſpring water each one pint, ſtyptic tincture three ounces, well mixed together.

If the ulcers ſhould continue foul, and their edges become callous, very ſmall quantities of the ſtrong mercurial ointment muſt be gently rubbed into the centre of the moſt inveterate, once in three or four days, cleanſing them occaſionally with one of the waſhes before mentioned. In this caſe one of the following balls muſt be given regularly every morning for a month or longer if neceſſary. The proportion of nitre muſt be altered to three ounces, and given in the water every evening, the ball being aſtminiſtered in the morning.

> *Mercurial alterative Ball.* TAKE Æthiops mineral four ounces, milk of brimſtone, prepared antimony, cream of tartar, and cinnabar of antimony, each five ounces; honey ſufficient to make a maſs;

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† P. 141.

which divide into a dozen equal balls, and roll up in liquorice or aniſeed powder.

It may not be improper now to add the ſymptoms of an incurable farcy, that the owners of ſuch horſes may ſave themſelves unneceſſary expenſe and trouble in their endeavours to obtain a cure. When a farcy, by improper applications, or by neglect, has ſpread and increaſed, or after loug continuance reſiſted the medicines above recommended; if freſh buds are continually ſpouting forth, while the old ones remain foul and ill-conditioned; if they riſe on the ſpines of the back and loins; if the horſe grows hide-bound, and runs at the noſe; if abſceſſes are formed in the fleſhy parts between the interſtices of the large muſcles; if his eyes look dead and lifeleſs; if he forſakes his food, and ſcours often, and his excrements appear thin and of a blackiſh colour; if the thigh or plate vein continues large and corded after firing and other proper applications; theſe ſymptoms denote the diſtemper to have penetrated internally, and that it will degenerate into an incurable conſumption: it is moſt probable alſo that the whole maſs of fluids are tainted, and become irremediable by art.

Before cloſing this ſection, it is proper to take notice of what is called the *water farcy;* which has no reſemblance to a true farcy either in its cauſe, ſymptoms, or effects, but has only obtained this name thro' cuſtom and ignorance.—This water-farcy, then, is of two kinds: one the product of a feveriſh diſpoſition, terminating on the ſkin, as often happens in epidemical colds; the other is dropſical, where the water is not confined to the belly and limbs, but ſhows itſelf in ſeveral parts of the body by ſoft ſwellings yielding to the preſſure of the finger. This laſt kind uſually proceeds from foul feeding, or from the latter graſs and fog that often comes up in great plenty with continued cold rains, and breeds a ſluggiſh viſcid blood. In the former caſe, we have ſeen the limbs and whole body enormouſly ſwelled, and very hard, the belly and ſheath greatly diſtended; which were as ſurpriſingly reduced in 24 hours, by ſlight ſcarifications within-ſide the leg and thigh with a ſharp penknife, and three or four ſtrokes on the ſkin of the belly on each ſide the ſheath: from theſe ſcarifications there was a conſtant and ſurpriſing large dripping of water, which ſoon relieved the horſe; when a few purges completed his recovery.

In the other ſpecies of dropſy the curative intentions are to diſcharge the water, recover the craſis or ſtrength of the blood, and brace up the relaxed fibres throughout the whole body. To this end purge once a-week or ten days; and give intermediately either of the following.

Take black hellebore freſh gathered, two pounds; waſh, bruiſe, and boil in ſix quarts of water to four; and then ſtrain out the liquor, and put two quarts of white-wine on the remaining hellebore, and let it infuſe warm 48 hours: then ſtrain off, mix both together, and give the horſe a pint night and morning.

Take nitre two ounces, ſquills powdered three drams or half an ounce, camphor one dram, honey enough to form into a ball, to be given once a-day alone, or waſhed down with a horn or two of the above drink.

Sect. XXV. *Of Strains in Various Parts.*

In all ſtrains, the muſcular or tendinous fibres are overſtretched; and ſometimes ruptured or broke. To form, therefore, a true idea of theſe diſorders, let us firſt conſider every muſcle and tendon as compoſed of ſpringy elaſtic fibres, which have a proper power of their own to contract and extend themſelves; or, to make their action more familiar, let us compare them to a piece of catgut, that we may the better judge with what propriety oily medicines are directed for their cure. Thus, then, if, by a violent extenſion of this catgut, you had ſo overſtretched it as to deſtroy its ſpringineſs or elaſticity, and was inclined to recover its loſt tone, would you for that purpoſe think of ſoaking it in oil? And is not the method of treating ſtrains, or overſtretched muſcles and tendons, full as prepoſterous, when you bathe or ſoak them in oily medicines, at a time that they want reſtringents to brace them up? Yet cuſtom has ſo eſtabliſhed this practice, and fallacious experience ſeemingly ſo confirmed it, that it would be a difficult taſk to convince the illiterate and prejudiced of the abſurdity, who, by attributing effects to wrong cauſes, are led into this error, and the oils uſurp the reputation that is due only to reſt and quiet: they ſeem, however, to be aware of the ill conſequences, by their adding the hot oils, as ſpike, turpentine, and origanum; which, though they in ſome meaſure guard againſt the too ſuppling quality of the other oils, yet the treatment is ſtill too relaxing to be of real ſervice.

And indeed, in all *violent* ſtrains of either tendons or muſcles, whatever opinion we may entertain of bathing and anointing with favourite noſtrums, which often ſucceed in ſlight caſes, where perhaps bandage alone would have done; yet it is the latter, with proper reſting the relaxed fibres till they have thoroughly recovered their tone, that are the chief things to be depended on; and frequently ſome months neceſſary for effecting the cure.

All violent ſtrains of the ligaments, which connect the bones together, eſpecially thoſe of the thigh, require time, and turning out to graſs, to a perfect recovery. External applications can avail but little here, the parts affected lying to deep, and ſo ſurrounded with muſcles that medicine cannot penetrate to them. The ſooner, in theſe caſes, a horſe is turned out to graſs, the better; as the gentle motion in the field will prevent the ligaments and joint oil from thickening, and of courſe the joint itſelf from growing ſtiff.

When a horſe's ſhoulder is overſtrained, he does not put out that leg as the other; but, to prevent pain, ſets the ſound foot hardily on the ground to ſave the other; even though he be turned ſhort on the lame ſide, which motion tries him the moſt of any. When trotted in hand, inſtead of putting his leg forward in a right line, he forms a circle with the lame leg; and when he ſtands in the ſtable, that leg is advanced before the other.

In order to cure this lameneſs, firſt bleed him, and let the whole ſhoulder be well bathed three times a-day with hot verjuice or vinegar, in which may be diſſolved a piece of ſoap; but if the lameneſs continues without ſwelling or inflammation, after reſting two or three days, let the muſcles be well rubbed for a conſiderable

Strains.

derable time, to make them penetrate, with good opodeldoc, or either of the following mixtures.

Take camphorated ſpirit of wine two ounces, oil of turpentine one ounce; this proportion will prevent the hair coming off.

Or, Take the beſt vinegar half a pint, ſpirit of vitriol and camphorated ſpirit of wine of each two ounces.

When the ſhoulder is very much ſwelled, it ſhould be fomented with woollen cloths (large enough to cover the whole) wrung out of hot verjuice and ſpirit of wine; or a fomentation prepared with a ſtrong decoction of wormwood, bay-leaves, and roſemary, to a quart of which may be added half a pint of ſpirit of wine.

A rowel in the point of the ſhoulder in this caſe often does great ſervice; eſpecially if the ſtrain has been very violent, and the ſwelling very large: but as to boring up the ſhoulder with a hot iron, and afterwards inflating it, is both a cruel and abſurd treatment: and the pegging up the ſound foot, or ſetting on a patten ſhoe, to bring the lame ſhoulder on a ſtretch, is a moſt prepoſterous practice, and directly calculated to render a horſe incurably lame; for it can only be neceſſary in caſes the very oppoſite to this, where the muſcles have been long contracted, and we want to ſtretch them out.

Where poultices can be applied, they are at firſt undoubtedly very effectual, after bathing with hot vinegar or verjuice; and are to be preferred greatly to cold charges, which, by drying ſo ſoon on the part, keep it ſtiff and uneaſy: let them be prepared with oatmeal, rye-flour, or bran boiled up in vinegar, ſtrong-beer or red-wine lees, with lard enough to prevent their growing ſtiff; and when by theſe means the inflammation and ſwelling is brought down, bathe the part twice a-day with either of the above mixtures, opodeldoc, or camphorated ſpirit of wine; and roll the part three or four inches, both above and below, with a ſtrong linen roller of about two fingers width; which contributes not a little to the recovery, by bracing up the relaxed tendon; and perhaps is more to be depended on than the applications themſelves.

In the ſtrains of the *coffin joint*, that have not been diſcovered in time, there will grow ſuch a ſtiffneſs in the joint, that the horſe will only touch the ground with his toe; and the joint cannot be played with the hand: the only method here is repeated bliſtering, and then firing ſuperficially.

Strains of the *back ſinews* are very common; and are eaſily diſcovered by the ſwelling, which extends ſometimes from the back-ſide of the knee down to the heel, but for the moſt part the horſe ſets that foot before the other. The tendon ſhould be well bathed three or four times a-day with hot vinegar; and if much ſwelled, apply the poultices above recommended; and when the ſwelling is down, bathe with the mixtures above, or with camphorated ſpirit of wine and oil of amber, in which is diſſolved as much camphor as the ſpirits will take up; and roll up the tendon with a proper bandage or laced ſtocking; which laſt, properly fitted to the limb, might be wore to great advantage, not only in theſe ſort of injuries, but in moſt others, where there is a diſpoſition to the greaſe, or other ſwellings of the limbs, from weak and relaxed fibres. Curriers ſhavings wetted with vinegar have been found uſeful for this purpoſe; as has alſo tar and ſpirit of wine: but where the tendons have ſuffered by repeated injuries of this kind, the caſe will demand bliſtering, firing, and proper reſt.

Strains.

Strains of the *knees* and *paſterns* ariſe frequently from kicks or blows: if they are much ſwelled, apply firſt the poultices; and when the ſwelling is abated, bathe with the above, or the following.

Take vinegar one pint, camphorated ſpirit of wine four ounces, white vitriol diſſolved in a little water two drams.

Or, Take the white of three or four eggs, beat them into a froth with a ſpoon; to which add an ounce of rock alum finely powdered; ſpirit of turpentine and wine of each half an ounce; mix them well together.

As great weakneſs remains in the paſterns after violent ſtrains, the beſt method is to turn the horſe out to graſs till he is perfectly recovered; when this cannot be complied with, the general way is to bliſter and fire.

When a horſe is lame in the *ſtifle*, he generally treads on his toe, and cannot ſet the heel to the ground. Treat him at firſt with the vinegar and cooling reſtringents: but if a large ſwelling, with puffineſs, enſues, foment it well with the diſcutient fomentation till it diſperſes; and then bathe the part with any of the above medicines.

A lameneſs in the *whirl-bone* and hip, is diſcovered by the horſe's dragging his leg after him, and dropping backward on his heel when he trots. If the muſcles of the hip are only injured, this kind of lameneſs is cured eaſily: but when the ligaments of the joint are affected, the cure is often very difficult, tedious, and uncertain. In either caſe, at firſt bathe the parts well with the cooling medicines, four or five times a-day in the muſcular ſtrain, this method alone may ſucceed; but in the ligamentous, it is reſt and time only can reſtore the injured parts to their proper tone.

Strains in the *hock* are to be treated by ſoaking the parts with coolers and repellers; but when the ligaments are hurt, and they are attended with great weakneſs and pain, uſe the fomentation. If a hardneſs ſhould remain on the outſide, it may be removed by repeated bliſtering; if within, it may be out of the power of any external applications to remove: however, the joint ſhould be fired gently with ſmall razes or lines pretty cloſe together, and then covered with a mercurial plaſter. To the diſcutient fomentation abovementioned may be added crude ſal ammoniac, with a handful of wood-aſhes boiled in it.

The bliſtering ointment for the above purpoſes may be found in the Section of *Bone ſpavin*; but the ſublimate ſhould be omitted.

The firing, ſo generally uſed for the ſtrengthening relaxed ſinews or tendons, is made to act upon different parts according to the different notions of the operator. Moſt uſually it is intended to act only on the ſkin, which by contracting and hardening it all round the ſinews, compreſſes them more firmly like a bandage. The bowmen of old, it is alledged, ſubmitted to this operation, in order to give ſtrength to the muſcles and tendons of their arms. Upon this principle, a proper degree of ſkill is very requiſite to perform it effectually

Tumors and Impoſthumes.

effectually on a horſe, for a due medium ſhould be obſerved, and the inſtrument neither ſo ſlightly applied as to ſcarify the ſkin only ſuperficially, nor ſo deep as to wound or cauteriſe the ſinew or its ſheath. The lines ſhould be drawn pretty cloſe together, on each ſide, of the joint or ſinew, following the courſe of the hair; no croſs lines ſhould be made, as they but disfigure the horſe afterwards, without any real uſe. The firing inſtrument, or knife, ought to be a little rounded on the edge, gradually thickening to the back, that it may retain the heat for ſome time, but ſhould not be applied till the inflaming redneſs is partly gone off. The cauterized parts may be bathed with ſpirit of wine at firſt; and anointed afterwards with bees-wax and oil, which alone is ſufficient to complete the cure. But, in every view, this operation deſerves to be condemned, upon the following judicious obſervations of Oſmer. "Between the tendon and the ſkin of the leg, as nothing intervenes but a thin membrane, what hand can determine betwixt the boundaries of thoſe bodies, whoſe appearance, by the heat of the iron, is made undiſtinguiſhable to the eye? Now mark the event of firing. If the fire reaches no further than the ſkin, little advantage can accrue to the tendon, but the fibres of the ſkin will become contracted and leſs pliant; if the fire reaches the membrane or ſheath of the tendon ſome of its glands are deſtroyed, and the tendon becomes more or leſs rigid. If the tendon be burnt, the conſequence will be ſtill worſe; and in either caſe the velocity of motion will be impeded: on all theſe occaſions the horſe ſhould be turned to graſs and indulged with proper reſt, that the diſeaſed parts may recover their former firmneſs, tone, and ſtrength."

SECT. XXVI. *Of Tumors and Impoſthumes.*

TUMORS, or ſwellings, ariſe either from external injuries or internal cauſes.

1. Swellings cauſed by external accidents, as blows and bruiſes, ſhould at firſt be treated with reſtringents: Thus, let the part be bathed frequently with hot vinegar or verjuice; and, where it will admit of bandage, let a flannel wetted with the ſame be rolled on: if by this method the ſwelling does not ſubſide, apply, eſpecially on the legs, a poultice with red wine lees, ſtrong-beer grounds, and oatmeal, or with vinegar, oil, and oatmeal: either of theſe may be continued twice a-day, after bathing, till the ſwelling abates: when in order to diſperſe it entirely, the vinegar ſhould be changed for camphorated ſpirit of wine, to four ounces of which may be added one of ſpirit of ſal ammoniac; or it may be bathed with a mixture of two ounces of crude ſal ammoniac boiled in a quart of chamber-lye twice a-day, and rags dipped in the ſame may be rolled on.

Fomentation made by boiling wormwood, bay-leaves, and roſemary, and adding a proper quantity of ſpirits, are often of great ſervice to thin the juices, and fit them for tranſpiration; eſpecially if the injury has affected the joints.

But in bruiſes, where the extravaſated blood will not by theſe means be diſperſed, the ſhorteſt way is to open the ſkin, and let out the grumes.

Critical tumors or ſwellings, which terminate fevers, ſhould by no means be diſperſed; except when they fall on the paſtern or coffin joint, ſo as to endanger them: in this caſe the diſcutient fomentation, (p. 143. col. 1.) ſhould be applied three or four times a-day, and a cloth or flannel frequently wrung out of the ſame ſhould be bound on, in order to keep the joint continually breathing.

Tumors and Impoſthumes.

But all tumors tending to a certain maturation (from whatever cauſe they originated), ſhould be expeditiouſly aſſiſted by fomentation as already directed; and, after each time of uſing the fomentation, the ripening encouraged by ſuppurating poultices wherever they can be applied: oatmeal boiled ſoft in milk, to which a proper quantity of oil and lard is added, may anſwer this purpoſe; or the the poultice recommended in the Section of *Strangles*. Theſe applications muſt be regularly continued till the matter is perceived to fluctuate under the fingers, when it ought to be let out: for which purpoſe, let the tumor be opened with a knife or ſtrong lancet, the whole length of the ſwelling, if it can be done ſafely; for nothing contributes ſo much to a kind healing as the matter's having a free diſcharge, and the opening's being big enough to dreſs to the bottom.

Pledgets of tow or lint ſpread with black or yellow baſilicon (or the wound ointment), and dipped in the ſame, melted down with a fifth part of oil of turpentine, ſhould be applied to the bottom of the ſore, and filled up lightly with the ſame, without craming: it may be thus dreſſed once or twice a-day, if the diſcharge is great, till a proper digeſtion is procured; when it ſhould be changed for pledgets ſpread with the red precipitate ointment, applied in the ſame manner.

Should the ſore not digeſt kindly, but run a thin water and look pale, foment, as often as you dreſs, with the above fomentation; and apply over your dreſſing the ſtrong-beer poultice, and continue this method till the matter grows thick, and the ſore florid.

The following ointments will generally anſwer your expectations in all common caſes; and may be prepared without, as well as with verdigreaſe.

TAKE Venice turpentine and bees-wax of each a pound, oil of olives one pound and a half, yellow roſin 12 ounces; when melted together, two or three ounces of verdigreaſe, finely powdered, may be ſtirred in, and kept ſo till cold, to prevent its ſubſiding.

TAKE of yellow baſilicon, or the above ointment, without verdigreaſe, four ounces; red precipitate, finely powdered, half an ounce: mix them together cold with a knife or ſpatula.

This laſt, applied early, will prevent a fungus, or proud fleſh, from ſhooting out: for if you dreſs too long with the above digeſtive, the fungus will riſe faſt, and give ſome trouble to ſuppreſs it; when it will be neceſſary to waſh the ſore, as often as your dreſs, with a ſolution of blue vitriol in water, or to ſprinkle it with burnt alum and precipitate. If theſe ſhould not be powerful enough, touch with a cauſtic, or waſh with the ſublimate water made by diſſolving half an ounce of corroſive ſublimate in a pint of lime-water.

But this trouble may in a great meaſure be prevented, if the ſore is on a part where bandages can be applied with compreſſes of linen-cloth: for even when theſe excreſcences regerminate, as it were, under the knife, and ſpring up in ſpite of the cauſtics abovementioned, they are to be ſubdued by moderate compreſſion made on the ſprouting fibres by theſe means.

As ſoon as the wound is ſkinned over, throwing aſide all greaſy applications, let the ſurface be hardened firſt with equal parts of tincture of myrrh and vinegar, afterwards with tincture of myrrh alone. If any eſchar of conſequence ſhould remain, and the hair not follow kindly, rub the part gently every night with a ſmall quantity of camphorated ſpermaceti ointment, the beſt article known to promote the return of the hair upon the knees or any other part.

Authors on farriery have given in general very proper receipts to anſwer every intention of this kind by medicines: but as they have not laid down ſufficient rules for their application in thoſe caſes where they are moſt wanted, the following general directions will not be unacceptable; as the difficulty in healing ſome kinds of ſores ariſes frequently from the unſkilful manner of dreſſing them.

It may be neceſſary then to obſerve here, once for all, that the cures of moſt ſores are effected by the ſimpleſt methods; and that it is often of much more conſequence to know how to dreſs a ſore, than what to dreſs it with. And in this conſiſts indeed the chief art of this branch of ſurgery: for the moſt eminent in that profeſſion have long ſince diſcovered, that variety of ointments and ſalves are unneceſſary in the cure of moſt wounds and ſores; and they have accordingly diſcarded the greateſt part formerly in repute for that purpoſe; repeated obſervations have taught them, that, after the digeſtion, nature is generally diſpoſed to heal up the wound faſt enough herſelf; and that the ſurgeon's chief care is to prevent a luxuriancy, commonly called *proud fleſh*; which all ointments, wherein lard or oil enters, are but too prone to encourage, as they keep the fibres too lax and ſupple; and which dry lint alone, early applied, as eaſily prevents, by its abſorbing quality, and light compreſſion on the ſprouting fibres.

Thus, if a hollow wound or ſore is crammed with tents, or the dreſſings are applied too hard, the tender ſhoots of fleſh from the bottom are prevented puſhing up; and the ſides of the ſore from this diſtenſion may in time grow horny and turn fiſtulous; nor has the matter by this method a free diſcharge.

On the other hand, if ſores of any depth are dreſſed ſuperficially, the external parts being more diſpoſed to heal and come together than the internal, they will fall into contact, or heal too ſoon; and the ſore, not filling up properly from the bottom, will break out afreſh.

Hence we may juſtly conceive how little ſtreſs is to be laid on famous ointments, or family ſalves, unſkilfully applied, for unleſs this due medium is obſerved, or obtained in the dreſſing, no hollow ſore can heal up properly.

As ſoon then as a good digeſtion is procured (which is known by the thickneſs and whiteneſs of the matter diſcharged, and the florid red colour at the bottom of the ſore), let the dreſſings be changed for the precipitate medicine; or the ſore may be filled up with dry lint alone, or dipped in lime-water, with a little honey and tincture of myrrh, or brandy, about a fifth part of the latter to one of the former: a pledget of lint, dipped in this mixture, ſhould alſo be applied to the bottom of the ſore, which ſhould be filled up with others to the ſurface or edges, but not crammed in too hard, as before obſerved, nor yet applied too looſely.

By this method the ſore would incarnate, or heal up properly, and ſoft ſpungy fleſh would be prevented or ſuppreſſed in time; whereas when ointments or ſalves are too long continued, a fungus, or proud fleſh, is thereby ſo encouraged in its growth, that it requires ſome time to deſtroy and eat it down again: a proper compreſs of cloth, and a linen roller, is abſolutely neceſſary both for this purpoſe and to ſecure on the dreſſings, wherever they can conveniently be applied.

2. Scrofulous tumors are ſuch as originate in ſcorbutic or hereditary taints, and increaſe or diminiſh according to the ſtate or acrimony of the blood. For theſe the principal application is the ſtrongeſt mercurial unguent, thus prepared.

QUICKSILVER two ounces, lard ſix ounces, balſam of ſulphur half an ounce. The quickſilver to be rubbed with the balſam in a metal mortar till the globules diſappear; then the lard (firſt made warm) to be added by degrees.

The uſe of this unguent muſt be aſſiſted by a courſe of mercurial and antimonial alteratives.

3. The other tumors that may be here noticed are, the œdematous, ſteatomatous, and encyſted. The œdematous and encyſted tumors are nearly ſynonymous, originating in a cyſt or bag, containing a kind of ichorous bloody ſanies or gelatinous fluid; which being evacuated, the cyſt does not always ſubmit to digeſtives or eſchorotics, but muſt be extirpated with the knife, and cured as a common wound.

The ſteatomatous are thoſe tumors that form on different parts, and paſs in general under the denomination of *wens*, containing, when opened or extracted, a ſubſtance not unlike ſuet when hardly cold.

Neither of the above are expected to ſubmit to any topical application, unleſs upon the very firſt obſervation; when an attempt may be made by the moſt powerful repellents, and a ſmall portion of the above mercurial ointment rubbed in every night, for a conſiderable length of time; but no radical cure can be in general obtained but by inſtrumental extirpation; and as this muſt be unavoidably attended with loſs of time, and a proportional ſhare of danger, if ſeated upon or interſected by the muſcular parts, perhaps it may be moſt prudent to omit the experiment and ſubmit it to chance.

SECT. XXVII. *Of Wounds in general.*

IN all freſh wounds made by cutting inſtruments, there is nothing more required than bringing the lips of the wound into contact by ſuture or bandage, provided the part will allow of it; for on wounds of the hips, or other prominent parts, and acroſs ſome of the large muſcles, the ſtitches are apt to burſt on the horſe's lying down and riſing up in the ſtall. In ſuch caſes, the lips ſhould not be brought cloſe together: one ſtitch is ſufficient for a wound two inches long; but in large wounds, they ſhould be at an inch or more diſtance; and if the wound is deep in the muſcles, care ſhould be taken to paſs the needles proportionably deep, otherwiſe the wound will not unite properly from the bottom.

Should the wound bleed much from an artery divided, the firſt ſtep ſhould be to ſecure it, by paſſing a crooked needle underneath, and tying it up with a waxed thread: if the artery cannot be got at this way, apply a button of lint or tow to the mouth of the bleeding veſſels, dipped in a ſtrong ſolution of blue vitriol, ſtyptic water, oil of vitriol, or hot oil of turpentine, powdered vitriol, or colcothar, &c. and remember always to apply it cloſe to the mouth of the bleeding veſſels, and take care that it is kept there by proper compreſs and bandage till an eſchar is formed; otherwiſe it will elude your expectations, and frequently alarm you with freſh bleedings.

In a memoir preſented to the Royal Academy of Sciences by M. La Foſſe, he gives an account of the ſucceſs he had met with in ſtopping the bleedings of very conſiderable arteries in horſes, by the application of the powder of puff-balls, the arteries cicatrizing by this means only, without any ſucceeding hæmorrhage. The lycoperdon, or puff-ball, was made uſe of for this purpoſe in human ſubjects, about 170 years ago, by Felix Wurtz, a famous old ſurgeon in Germany; but he does not ſeem to have thought of truſting to it in ſuch conſiderable arteries as M. La Foſſe mentions, *viz.* thoſe of the leg and thigh, the bleedings from which divided veſſels he ſtopt in a few minutes by the uſe of this powder only. The agaric of the oak may alſo be uſed for this purpoſe, where it can be retained by a proper bandage.

Theſe applications, as indeed all ſtyptics, ſeem to act by conſtringing the extremity of the veſſel, or choaking it up, till a grume of blood is formed internally, which plugs up the orifice; and has been found to adhere to it ſo as to conſtitute one body with the veſſel.

We avoid ſetting down any famous receipts for freſh wounds, whether ointments, or Friar's balſams, being well aſſured, that, in a healthy ſound conſtitution, nature furniſhes the beſt balſam, and performs herſelf the cure, which is ſo often attributed to the medicine; when it is otherwiſe, and the blood is deprived of its balſamic ſtate, as will appear from the aſpect of the wound and its manner of healing, it muſt be rectified by proper internal medicines, before a good foundation for healing can be laid by any external application whatever.

The lips of the wound then being brought together by the needle or bandage, it needs only to be covered with rags dipped in brandy, or a pledget of tow ſpread with the wound ointment, (ſee page 144. col. 2.) the directions in the preceding ſections being obſerved, and the wounded part kept as much as poſſible from motion.

Punctured wounds from thorns, or any other accident, ſhould be treated in the ſame manner; applying the beer or bread and milk poultice over the dreſſing, till ſome ſigns of digeſtion appear; and fomenting the part well every day. This method is alſo very ſucceſsfully uſed to thoſe ſwellings which often ariſe on the neck from bleeding; the ſores being ſprinkled with precipitate, and burnt allum powdered, to fetch out the core or fungus, which choaks up the orifice. The uſual method is to introduce a piece of vitriol, or ſublimate, which often brings on a plentiful diſcharge, fetches out the core, and makes a cure; but it is often with the loſs of the vein, and it ſometimes leaves a large ſwelling and impoſthumation.

In gun-ſhot wounds, when the ball has not penetrated too deep, it ſhould be extracted, if it can be fetched away without diſturbance, together with any extraneous bodies that might paſs in with it; the wound ſhould be dreſſed with the old digeſtive of Venice or common turpentine, divided with the yolks of eggs, to which may be added ſome honey and tincture of myrrh. The entrance of theſe wounds frequently requires to be enlarged, and a depending orifice ſhould always be procured if poſſible; and if the wound ſhould not digeſt kindly, apply the beer poultice, and foment with the diſcutient fomentation before mentioned.

In ſcalds, or burns from gunpowder, or any other cauſe, when the ſkin remains entire, bathe the part well, and keep it ſoaked with rags dipped in ſpirit of wine camphorated: ſalt bound thick on the part has been found very effectual for this purpoſe; and indeed all ſaline and ſpirituous applications excel others, while the ſkin is yet unbroke; but when the ſkin is ſeparated, anoint the part, and keep it conſtantly ſupple with linſeed or ſalad oil, and a plaſter ſpread with bees-wax and oil; if the ſkin is ſo ſcorched, that ſloughs muſt be digeſted out, dreſs with the wound-ointment and oil of turpentine, and finiſh the cure with any drying ointment. Should the horſe be feveriſh from the pain, bleed him, give cooling glyſters, and treat him as we have directed in ſimple fevers.

There are certain wounds which occur much more frequently than any other, and which from that circumſtance, though in themſelves not at all dangerous, deſerve particular notice. Among theſe are broken knees, over-reaches, and lacerations between hair and hoof. In reſpect to the firſt, it is a misfortune whenever it happens that not only reduces the horſe very much in his value, but is conſidered as an indelible ſtigma of imperfection, that (with connoiſſeurs) renders him at firſt ſight unworthy a ſecond conſideration. This misfortune may ſometimes be occaſioned by unavoidable accident; but Mr Taplin is juſtly of opinion that more horſes are thrown down and irremediably injured by the careleſſneſs and ſhameful inattention of bad riders on bad roads and over rolling ſtones, or when they are more cruelly exhauſted with labour and fatigue, than by any other means in the whole liſt of accidents.

In relieving this injury, the firſt ſtep is to waſh the parts well with a ſponge and warm water, thoroughly cleanſing the lacerations from gravel or ſand; for theſe will evidently irritate and inflame the tender parts, and be productive of a diſchaage which may often be entirely prevented by gently wiping them dry after the uſe of the ſponge, and plentifully embrocating them with a mixture of camphorated ſpirits and vinegar in equal quantities, bandaging over a pledget of tow wet with the ſame, and repeating it once or twice if circumſtances ſhould render it neceſſary. This ſhould be continued, that an eſchar or cicatrix may be formed to render unctuous or greaſy applications unneceſſary; but ſhould the wound or laceration be ſo violent as to produce great inflammation, ſuppuration muſt enſue, and ought to be encouraged by the means already directed, and the ſore healed in the manner alſo above directed.

As to over-reaches and other injuries in the feet, they are treated of in their order under *Diſeaſes of the Feet*.

Ulcers in General.

Sect. XXVIII. *Of Ulcers in General.*

We ſhall not here enter into a deſcription of each particular ſpecies of ulcers, but only lay down ſome directions for their general treatment; by which means we ſhall avoid the uſual prolixity of authors on this ſubject, and yet give ſo general an idea of the nature of ulcers, as we hope will be ſufficiently inſtructive both of the application and of the proper remedy to each.

It may be neceſſary to obſerve, that we may often in vain purſue the beſt methods of cure by external applications, unleſs we have recourſe to proper internal remedies; for as all ulcers, difficult to heal, proceed from a particular indiſpoſition of the blood and juices, before the former can be brought into any order, the latter muſt be corrected by alteratives and ſweetening medicines.

The firſt intention in the cure of ulcers is bringing them to digeſt or diſcharge a thick matter; which will, in general, be effected by the green ointment, or that with precipitate; but ſhould the ſore not digeſt kindly by theſe means, but diſcharge a gleety thin matter, and look pale, you muſt then have recourſe to warmer dreſſings, ſuch as balſam, or oil of turpentine, melted down with your common digeſtive, and the ſtrong-beer poultice over them; it is proper alſo in theſe kind of ſores, where the circulation is languid, and the natural heat abated, to warm the part, and quicken the motion of the blood, by fomenting it well at the time of dreſſing; which method will thicken the matter, and rouſe the native heat of the part, and then the former dreſſings may be re-applied.

If the lips of the ulcer grow hard or callous, it will be neceſſary to foment ſtrongly with a decoction of camomile and mallows, as hot as can be conveniently applied; then ſcarify ſuperficially the whole part, both longitudinally and tranſverſely, with a fleam or abſceſs lancet, ſo as entirely to penetrate the callous ſubſtance upon the ſurface: after which it muſt be dreſſed with digeſtive ointment twice every day; the fomentations and ſcarifications to be repeated occaſionally, if neceſſary, till the calloſity is quite ſloughed off, and comes away with the dreſſings. A proper ointment for the above purpoſe may be prepared as follows.

Take of yellow baſilicon two ounces, and black baſilicon one ounce, and melt them together over the fire. When taken off, ſtir in one ounce of turpentine; and when cool, add half an ounce of red precipitate finely powdered, the whole to be minutely incorporated upon a ſtone or marble ſlab.

As ſoon as the calloſity is removed, and the diſcharge comes to its proper conſiſtence, dreſs in general with a ſmall portion of lint, thinly covered with either of the baſilicons, placed under a pledget of tow ſpread with the following digeſtive:

Yellow wax and black roſin each four ounces, Burgundy pich two ounces; melt theſe in a pint of olive oil over a ſlow fire; and when taken off, ſtir in two ounces of turpentine. For large wounds, where a plentiful diſcharge is required, ſtir into this quantity three ounces of the ſpirits of turpentine, that it may incorporate in getting cool.

Should the wound incarnate too faſt, and fill with fungous fleſh, ſlightly touch ſuch parts with a piece of unſlacked lime, regulating the mode and application by the neceſſity, and repeating it as occaſion may require. When the cicatrix is nearly formed, the cure may be completed by hardening the ſurface with a little tincture of myrrh.

Ulcers in General.

All ſinuſes or cavities, if no tendinous parts intervene, ſhould be inſtantly laid open (with a biſtory) to its utmoſt extent, and properly filled with a pledget of lint, well impregnated with warm digeſtive, and plentifully covered with tow ſpread with the ſame. After a ſecond or third dreſſing, ſhould the inſide of ſuch cavity prove callous or hard in ſubſtance, it muſt be taken away by the knife, or deſtroyed by the means before deſcribed. If it be ſo ſituated that the parts forbid an entire ſeparation, ſound with the probe, and at its extremity make a counter inciſion through the integuments to meet the probe, till by paſſing through, it removes any lodgment that may have been left for the matter to corrode, which it will very ſoon do, ſo as in many caſes to affect the bone itſelf.

Where the cavity penetrates deep into the muſcles, and a counter opening is impracticable or hazardous; where, by a continuance, the integuments of the muſcles are conſtantly dripping and melting down; in theſe caſes waſhes may be injected, and will frequently be attended with ſucceſs. The following is particularly recommended by Mr Taplin.

Take honey and vinegar each two ounces; liquefy over the fire; and when cool add tincture of myrrh and tincture of cantharides each one ounce. —Mix.

When the ulcer is by theſe means diveſted of its virulence and bad ſmell, the calloſity ſloughed off or extracted, and a favourable appearance of incarnation comes on, the dreſſings may be changed from the precipitate digeſtive before preſcribed, to pledgets ſpread with Locatellus's balſam, or the following compound.

Take white diachylon two ounces, Locatellus's balſam one ounce, and melt them over the fire in two ounces of olive oil. Take off, and when nearly cool, ſtir in an ounce of balſam of capivi, a little at a time, till it is all incorporated.

Theſe ſinuſes, or cavities, frequently degenerate into *fiſtulæ*, that is grow pipey, having the inſide thickened, and lined as it were, with a horny callous ſubſtance. In order to their cure, they muſt be laid open, and the hard ſubſtance all cut away; where this is impracticable, ſcarify them well, and truſt to the precipitate medicine made ſtrong, rubbing now and then with cauſtic, butter of antimony, or equal parts of quickſilver and aquafortis.

When a rotten or foul bone is an attendant on an ulcer, the fleſh is generally looſe and flabby; the diſcharge oily, thin, and ſtinking; and the bone diſcovered to be carious, by its feeling rough to the probe paſſed through the fleſh for that purpoſe. In order to a cure the bone muſt be laid bare, that the rotten part of it be removed: for which purpoſe, deſtroy the looſe fleſh, and dreſs with dry lint; or the doſſils may be preſſed out of tincture of myrrh or euphorbium. The throwing off the ſcale is generally a work of nature, which is effected in more or leſs time, and in proportion to the depth the bone is affected; though burning the bone is thought by ſome to haſten its ſeparation.

Where the cure does not properly ſucceed, mercurial phyſic ſhould be given, and repeated at proper intervals: and to correct and mend the blood and juices, the antimonial and alterative powders, with a decoction of guaiacum and lime-water, are proper for that purpoſe.

Sect. XXIX. *Of a Bone-Spavin.*

Without entering at all into the cauſe of this diſorder, which is a bony excreſcence, or hard ſwelling, growing on the inſide of the hock of a horſe's leg, we ſhall content ourſelves with deſcribing the different kinds thereof by their ſymptoms, and then enter on their cure.

A ſpavin that begins on the lower part of the hock, is not ſo dangerous as that which puts out higher, between the two round proceſſes of the leg-bone; and a ſpavin near the edge is not ſo bad as that which is more inward toward the middle, as it does not ſo much affect the bending of the hock.

A ſpavin, that comes by a kick or blow, is at firſt no true ſpavin, but a bruiſe on the bone or membrane which covers it, therefore not of that conſequence as when it proceeds from a natural cauſe: and thoſe that put out on colts and young horſes, are not ſo bad as thoſe that happen to horſes in their full ſtrength and maturity; but in very old horſes they are generally incurable.

The uſual method of treating this diſorder is by bliſters and firing; without any regard to the ſituation, or cauſe whence it proceeds. Thus, if a fulneſs on the fore-part of the hock comes upon hard riding, or any other violence which threatens a ſpavin; in that caſe, ſuch coolers and repellers are proper, as are recommended in ſtrains and bruiſes. Thoſe happening to colts and young horſes are generally ſuperficial, and require only the milder applications; for it is better to wear them down by degrees, than to remove them at once by ſevere means.

Various are the preſcriptions for the bliſtering ointment; but the following, on proper experience, ſtands well recommended by Mr Gibſon.

> Take nerve and marſhmallow ointment, of each two ounces; quickſilver, one ounce, thoroughly broke with an ounce of Venice turpentine; Spaniſh flies powdered, a dram and a half: ſublimate, one dram; oil of origanum, two drams.

The hair is to be cut as cloſe as poſſible, and then the ointment applied pretty thick over the part; this ſhould be done in the morning, and the horſe kept tied up all day without any litter till night; when he may be untied, in order to lie down; and a pitch or any ſticking plaſter may be laid over it, and bound on with a broad tape or bandage to keep all cloſe.

After the bliſter has done running, and the ſcabs begin to dry and peel off, it may be applied a ſecond time, in the ſame manner as before; this ſecond application generally taking greater effect than the firſt, and in colts and young horſes makes a perfect cure.

When the ſpavin has been of long ſtanding, it will require to be renewed, perhaps five or ſix times: but after the ſecond application, a greater diſtance of time muſt be allowed, otherwiſe it might leave a ſcar, or cauſe a baldneſs; to prevent which, once a-fortnight or three weeks is often enough; and it may in this manner be continued ſix or ſeven times, without the leaſt blemiſh, and will generally be attended with ſucceſs.

But the ſpavins that put out on older or full-aged horſes are apt to be more obſtinate, as being ſeated more inward; and when they run among the ſinuoſities of the joint, they are for the moſt part incurable, as they then lie out of the reach of applications, and are arrived to a degree of impenetrable hardneſs.

The uſual method in theſe caſes is to fire directly, or to uſe the ſtrongeſt kind of cauſtic bliſters; and ſometimes to fire and lay the bliſter immediately over the part: but this way ſeldom ſucceeds farther than putting a ſtop to the growth of the ſpavin, and is apt to leave both a blemiſh and ſtiffneſs behind; beſides the great riſk run (by applications of theſe fiery and cauſtic medicines to the nervous and tendinous parts about the joints) of exciting violent pain and anguiſh, and deſtroying the limb.

The beſt and ſafeſt way, therefore, is to make trial of the bliſtering ointment above, and to continue it according to the directions there laid down, for ſome months, if found neceſſary; the horſes in the intervals working moderately: the hardneſs will thus be diſſolved by degrees, and wear away inſenſibly.

Where the ſpavin lies deep, and runs ſo far into the hollow of the joint that no application can reach it, neither firing nor medicines can avail, for the reaſons abovementioned; though bold ignorant fellows have ſometimes ſucceeded in caſes of this ſort (by men of judgment deemed incurable) by the application of cauſtic ointments with ſublimate, which act very forcibly, enter deep, and make a large diſcharge, and by that means deſtroy a great part of the ſubſtance, and diſſolve away the remainder: though, whoever is at all acquainted with the nature of theſe medicines, muſt know how dangerous in general their operation is on theſe occaſions; and that a proper prepared cautery, made like a fleam, under the direction of a ſkilful hand, may be applied with leſs danger of injuring either tendons or ligaments. After the ſubſtance of the ſwelling has been properly penetrated by the inſtrument, it muſt be kept running by the precipitate medicine, or mild bliſtering ointment. Where the ſpavin lies not deep in the joint, and the bliſtering method will not ſucceed, the ſwelling may be ſafely fired with a thin iron forced pretty deep into the ſubſtance, and then ſhould be dreſſed as is above directed.

Sect. XXX. *Of a Curb and Ring-bone.*

1. As a ſpavin riſes among the bones on the fore-part of the hocks ſo a curb takes its origin from the junctures of the ſame bones, and riſes on the hind-part, forming a pretty large tumor over the back part of the hind-leg, attended with ſtiffneſs, and ſometimes with pain and lameneſs.

A curb proceeds from the ſame cauſes that produce ſpavins; viz. hard ridings, ſtrains, blows, or kicks. The cure at firſt is generally eaſy enough effected by bliſtering, repeated two or three times, or oftener. If it does not ſubmit to this treatment, but grows exceſſively hard, the quickeſt and ſureſt way is to fire with a thin iron, making a line down the middle from top to bottom, and drawing ſeveral lines in a penniform manner pretty deep; and then to apply a mild bliſtering

Splents.

ing plaſter or ointment over it.—This method will entirely remove it.

There is another ſwelling taken notice of on the outſide of the hock, which is called a *jarden*. This commonly proceeds from blows and kicks of other horſes; but frequently happens to maneged horſes, by ſetting them on their haunches: it is ſeldom attended with much lameneſs, unleſs it has been neglected, or ſome little proceſs of the bone be broke. It ſhould firſt be treated with the coolers and repellers in ſect. xxxii. art. 2: but if any ſwelling continues hard and inſenſible, the beſt way is to bliſter or fire; but the mild bliſters alone generally ſucceed.

2. The *ring-bone* is a hard ſwelling on the lower part of the paſtern, which generally reaches half way round the fore-part thereof, and from its reſemblance to a ring has its denomination. It often ariſes from ſtrains, &c.; and, when behind from putting young horſes too early upon their haunches; for in that attitude a horſe throws his whole weight as much, if not more, upon his paſterns, than on his hocks.

When it appears diſtinctly round the paſtern, and does not run downwards towards the coronet, ſo as to affect the coffin-joint, it is eaſily cured: but if it takes its origin from ſome ſtrain or defect in the joint originally, or if a calloſity is found under the round ligament that covers that joint, the cure is generally dubious, and ſometimes impracticable; as it is apt to turn to a quittor, and in the end to form an ulcer upon the hoof.

The ring-bones that appear on colts and young horſes, will often inſenſibly wear off themſelves, without the help of any application; but when the ſubſtance remains, there needs no other remedy beſides bliſtering, unleſs when by long continuance it is grown to an obſtinate hardneſs, and then it may require both bliſtering and firing.

To fire a ring-bone ſucceſsfully, let the operation be performed with a thinner inſtrument than the common one, and let the lines or razes be made not above a quarter of an inch diſtant, croſſing them obliquely, ſomewhat like a chain: apply a mild bliſter over all, and, when quite dried up, the rupture-plaſter; and then turn the horſe to graſs for ſome time.

Sect. XXXI. *Of Splents.*

These are hard excreſcences that grow on the ſhank-bone, and are of various ſhapes and ſizes. Some horſes are more ſubject to ſplents than others; but young horſes are moſt liable to theſe infirmities, which often wear off and diſappear of themſelves. Few horſes put out ſplents after they are ſeven or eight years old, unleſs they meet with blows or accidents.

A ſplent that ariſes in the middle of the ſhank-bone is nowiſe dangerous; but thoſe that ariſe on the back part of this bone, when they grow large and preſs againſt the back ſinew, always cauſe lameneſs or ſtiffneſs, by rubbing againſt it: the others, except they are ſituated near the joints, ſeldom occaſion lameneſs.

As to the cure of ſplents, the beſt way is not to meddle with them unleſs they are ſo large as to diſfigure a horſe, or are ſo ſituated as to endanger his going lame.

Splents in their infancy, and on their firſt appearance, ſhould be well bathed with vinegar, or old verjuice; which, by ſtrengthening the fibres, often put a ſtop to their growth; for the membrane covering the bone, and not the bone itſelf, is here thickened; and in ſome conſtitutions purging, and afterwards diuretic drinks, will be a great means to remove the humidity and moiſture about the limbs, which is what often gives riſe to ſuch excreſcences.

Poll evil, Fiſtula, &c.

Various are the remedies preſcribed for this diſorder: the uſual way is to rub the ſplent with a round ſtick or the handle of a hammer till it is almoſt raw, and then touch it with oil of origanum. Others lay on a pitch-plaſter, with a little ſublimate or arſenic, to deſtroy the ſubſtance; ſome uſe oil of vitriol; ſome tincture of cantharides: all which methods have at times ſucceeded; only they are apt to leave a ſcar, with the loſs of hair. Thoſe applications that are of a more cauſtic nature often do more hurt than good, eſpecially when the ſplent is grown very hard, as they produce a rottenneſs, which keeps running ſeveral months before the ulcer can be healed, and then leaves an ugly ſcar.

According to Mr Taplin, the only expectation of cure "without anxiety and difficulty, is to be careful in obſerving ſuch appearances, in their earlieſt ſtate; and then ſeeing that frequent friction is uſed for a conſiderable time, twice every day, with the utmoſt force of the operator's hands, letting the part be well moiſtened, after each time of rubbing, with a proportion of the following liniment, leaving a pledget of tow wet with the ſame, bound on pretty firm with two yards of wide tape as a roller:

"Take camphorated ſpirits of wine, and ſpirits of turpentine of each four ounces (a quarter of a pint), Mix together.

"Or, Oil of origanum and ſpirits of turpentine, each half an ounce; camphorated ſpirits of wine, two ounces.—Mix.

"When this plan has been perſevered in for ten days or a fortnight, you will then be able to judge whether any perceptible advantage has been obtained from the force of theſe powerful repellents: if not, procure two ounces of the ſtrongeſt mercurial ointment, and let the ſize of a hazel-nut be well rubbed in upon the part affected, every night and morning, till the whole is conſumed, uſing the roller each night, and taking it off in the morning. If this does not ſucceed, the beſt and moſt ſpeedy method will be the immediate extirpation, by making a longitudinal inciſion ('without bruiſing, hammering,' &c.) through the integuments, diſſecting and extracting the ſubſtance, completing the cure by taking up a couple of ſtitches, and treating it as a ſuperficial wound; for which directions will be found under that head."

Sect. XXXII. *Of the Poll-evil; Fiſtula, and Bruiſes on the Withers; Warbles on the Back, and Sit-faſts.*

1. The *poll-evil* is an abſceſs near the poll of a horſe, formed in the ſinuſes between the poll-bone and the upper vertebræ of the neck.

If it proceeds from blows, bruiſes, or any external violence, at firſt bathe the ſwelling often with hot vinegar; and if the hair be fretted off with an ouzing through the ſkin, make uſe of two parts of vinegar and one of ſpirit of wine; but if there be an itching, with heat and inflammation, the ſafeſt way is to bleed, and apply poultices with bread, milk, and elder flowers: this method, with the aſſiſtance of phyſic, will frequently diſperſe the ſwelling and prevent this evil.

But when the tumour is critical, and has all the ſigns of matter, the beſt method then is to forward it by applying the ripening poultices already taken notice of, till it comes to maturity, and burſts of itſelf: or if opened with a knife, great care ſhould be taken to avoid the tendinous ligament that runs along the neck under the mane; when matter is on both ſides, the opening muſt be made on each ſide, and the ligament remain undivided.

If the matter flows in great quantities, reſembles melted glue, and is of an oily conſiſtence, it will require a ſecond inciſion, eſpecially if any cavities are diſcovered by the finger or probe; theſe ſhould be opened by the knife, the orifices made depending, and the wound dreſſed with the common digeſtive of turpentine, honey, and the tincture of myrrh, and, after digeſtion, with the precipitate ointment: or waſh with the following made hot, and fill up the cavity with tow ſoaked into it:

> Vinegar or ſpirit of wine half a pint, white vitriol diſſolved in ſpring-water half an ounce, tincture of myrrh four ounces.

This may be made ſharper by adding more vitriol; but if the fleſh is very luxuriant, it ſhould firſt be pared down with a knife before the application. With this waſh alone Mr Gibſon has cured this diſorder without any other formality of dreſſing, waſhing with it twice a-day, and laying over the part a quantity of tow ſoaked in vinegar and the white of eggs beat together.

But the moſt compendious method of cure, is that by *ſcalding*, as the farriers term it; and which uſed to be proſecuted when the ſore was foul, of a bad diſpoſition, and attended with a profuſion of matter. But the cruelty, abſurdity, and inutility of the practice have become ſo apparent, that it ſeems now to be almoſt univerſally exploded; ſo that it would be ſuperfluous to give any deſcription of the operation.

2. *Bruiſes* on the *withers* frequently impoſthumate, and for want of care turn fiſtulous. They ariſe often from pinches of the ſaddle, and ſhould be treated with repellers: for this purpoſe bathe the tumor well with hot vinegar three or four times a-day; if that does not ſucceed alone, an ounce of oil of vitriol may be put to a quart of vinegar, or half an ounce of white vitriol diſſolved in a little water, and added to the ſame quantity. Theſe are generally held as very effectual repellers for this purpoſe in horſes, and will frequently prevent impoſthumation: when the ſwelling is attended with heat, ſmarting, and little hot watery pimples, the following mixture will then be more proper to bathe with.

> Take two ounces of crude ſal ammoniac, boiled in a quart of lime-water; where that cannot be had, a handful of pearl or wood aſhes may be boiled in common water: pour off the decoction when ſettled, and mix with it half a pint of ſpirit of wine: anoint the part afterwards with lintſeed oil, or elder ointment, to ſoften and ſmooth the ſkin.

But when the ſwellings are critical, the conſequence of the fever ſettled on this part, you muſt avoid the repelling method, and aſſiſt in bringing the ſwelling to matter, by means of ſuppurating poultices: experienced farriers adviſe, never to open thoſe tumors till they break of themſelves: for if they are opened before they are ripe, the whole ſore will be ſpongy, and diſcharge a bloody ichor, which ſoon degenerates into a ſordid ulcer. But take care to enlarge the openings, and pare away the lips, that your dreſſings may be applied eaſily; and avoid the ligament which runs along the neck to the withers: if a gathering forms on the oppoſite ſide, open it in the ſame manner; but take care they incline downwards, for the ſake of depending orifices, and letting the matter flow off eaſily. For the method of dreſſing, we muſt refer to the former part of this Section; and if the bones ſhould be found foul, they muſt be dreſſed with tincture of myrrh till they ſcale off. If the fungus is very troubleſome, and the diſcharge oily, yellow, and viſcid, pledgets ſoaked in the following, made hot, have been found very effectual, bathing the ſwelling round with ſpirit of wine and vinegar:

> Take half an ounce of blue vitriol diſſolved in a pint of water; oil of turpentine, and rectified ſpirit of wine, of each four ounces; white-wine vinegar, ſix ounces; oil of vitriol and Ægyptiacum, of each two ounces.

When the cavities are truly fiſtulous, the calloſities muſt be cut out, where it can be done, with a knife; and the remainder deſtroyed by corroſives.

3. *Warbles* are ſmall hard tumors under the ſaddle-part of the horſe's back, occaſioned by the heat of the ſaddle in travelling, or its uneaſy ſituation. As ſoon as the ſaddle is taken off after a ſevere chaſe or hard journey, a good groom or hoſtler will be very minute in his examinations to diſcover whether any injury has been ſuſtained in this part or any other. He will inſtantly perceive, by the horſe's wincing, whether there is any defect from which a warble may ſpeedily enſue; if, ſo, upon the firſt appearance, or earlieſt diſcovery, bathe three or four times a-day with the following repellent:

> Extract of Saturn half an ounce, camphorated ſpirit of wine two ounces, ſoft water a quarter of a pint; the extract and ſpirit being well-mixed by ſhaking, before adding the water.

4. *A ſit-faſt* proceeds generally from a warble, and is the horſe's hide turned horny or callous. In ſome little time the hair comes off, and it bears the appearance of a foreign ſolid ſubſtance, fixed in the centre of what ſeems to be a ſuperficial wound. For this ſimple and very trifling complaint there is but one certain and expeditious cure, namely, *extirpation*; which may be performed with a common penknife. But the moſt ready and leaſt painful method of taking it off is by juſt raiſing either edge till it can be taken hold of with a pair of common pincers; when, by leaning them to any ſide, you have an immediate fulcrum, or lever, and ſeparate it inſtantaneouſly without pain or inconvenience. After the extirpation, it may be treated as a ſimple ſuperficial laceration, and may in general be healed by a frequent application of Friar's balſam, tincture of myrrh, or even with a little common brandy. Due care, however, ſhould always be taken to guard the cicatrix in its infancy, and prevent the

Poll-evil, Fiſtula, &c.

buckle of the girth from coming into direct contact with the injured part, not only till the ſurface is ſufficiently hardened to render a repetition unlikely, but upon all future occaſions.

Some parts of the above treament of tumors, however, has been condemned, and a more ſimple method by means of ſetons recommended, by that judicious practitioner Mr Clark of Edinburgh. "The common method (ſays he†) of treating thoſe large tumors which are ſeated on the upper part of the neck, immediately behind the ears, generally known by the name of the *poll-evil*, and thoſe which are ſeated on the withers or upper parts of the ſhoulders, is exceedingly improper. They are either allowed to break of themſelves, or are opened the whole length of the tumor on the upper part. In this ſituation, eſpecially in the poll-evil, when the head is always kept in an erect poſition, the matter contained in the tumor cannot be diſcharged from it, but is retained in the bottom of the wound, and expoſed to the external air, &c.: it ſoon acquires a moſt ichorous corroding quality, and produces one of the largeſt and the moſt ſordid fiſtulous ulcers that horſes are infeſted with: a great quantity of fungous or proud fleſh is ſoon produced; this requires to be repeatedly extirpated with the knife, the loſs of which cannot be again ſupplied; hence the horſe is greatly diſfigured, the cure becomes both tedious and uncertain, and is ſeldom radical. In ſome caſes, I have known the vertebræ of the neck affected by the ſharpneſs of the confined matter, forming lodgments there, and, after great trouble and expence, the horſes were put to death.

"All theſe kinds of tumors, &c. are eaſily and ſpeedily diſcuſſed by the uſe of ſetons, without any loſs of ſubſtance, or diſfiguring of the parts, and cured with the greateſt certainty when the operation is properly performed. Of a number of caſes, in my practice, where this operation has ſucceeded with great expedition in curing theſe tumors, I ſhall only mention the following.

"About ſix years ago, an Arabian horſe, belonging to a gentleman in this place, had a large tumour ſeated a little on one ſide of the withers, or upper part of the ſhoulder; it was forwarded by applying emollient poultices; and as ſoon as the matter was perceived to fluctuate in the tumor, a large ſeton needle, armed with a cord at the other end, was introduced at the upper part of the ſwelling, and brought out at the under or lowermoſt part of it; the matter was diſcharged at the lower orifice in a very ſhort time, the tumor was by that means ſoon diſcuſſed, and, in a few weeks, it was entirely healed up, without any ſcar or blemiſh remaining, farther than a little baldneſs about the lower orifice, occaſioned by the ſharpneſs of the matter, which likewiſe ſoon diſappeared, and not the leaſt trace of the diſorder remained.

"The other caſe happened about ſeven years ago: a coach-horſe (belonging to a nobleman in the neighbourhood) had a large tumor a little behind the ears, on the neck, which I have formerly obſerved is called the *poll-evil*; the tumor extended to both ſides of the neck, and was divided in the middle by the mane; the tumor had been opened on one ſide, in a very ſuperficial manner, by a farrier in the country, before the matter in it was ſufficiently digeſted; after applying a few emollient poultices, in order to ripen it, a ſtrong ſeton needle, was introduced at the upper part of it, almoſt cloſe to the mane, and after paſſing it through the bottom of the tumor, which was very deep, the needle was brough out through the ſound muſcular parts below the tumor, in order to procure a ſloping or depending orifice for the matter to run freely off. The ſame operation was likewiſe performed on the oppoſite ſide, beginning near the mane, and finiſhed in the ſame manner. In a few weeks the cure was completed. The horſe run for ſeveral years in the ſame nobleman's carriage, without the ſmalleſt veſtige of his former diſorder.

"From this method of treating theſe tumors, together with the uſe of alterative medicines, &c. which in caſes of this nature ought never to be omitted, they were entirely diſcuſſed, and the perforations made by the needle ſoon healed up, without the leaſt deformity of the parts. I have therefore given the hiſtory of theſe caſes, to ſhow with what facility and expedition ſuch tumors may be carried off by the uſe of ſetons, in preference to the common methods uſed, and even recommended by different authors; ſuch as, after opening theſe tumors by deep inciſions, and pouring into them the moſt corroſive mixtures, made ſcalding hot, together with a long tedious courſe of hot irritating applications, by which the poor animals are kept in the utmoſt torture for a conſiderable time, and in the end are ſo diſfigured by the loſs of ſubſtance, occaſioned by the cutting away ſo much of the fleſh from the parts, that ſuch horſes are generally rendered unfit for any thing but the meaneſt drudgery.

"Deep-ſeated abſceſſes are cured in the ſame manner by the uſe of ſetons; after tracing the ſinuſes or cavities of the abſceſs with a long ſlender blunt lead probe (which yields eaſily without forcing its way through the cellular membrane, or taking a direction between the interſtices of the muſcles), the needle, armed with a cord, ſhould follow the direction of the *ſinews* or *pipes*, as they are commonly called, to the moſt depending part; and in caſe there ſhould be two or more ſinuſes, which ſometimes happens, each of them ſhould be treated in the ſame manner, in order to obtain a depending orifice for a free diſcharge of the matter, and which being once procured, ſeldom fails of completing a cure."

Sect. XXXIII. *Of Wind-galls Blood and Bog Spavins.*

Wind-galls Blood and Bog Spavins.

1. A Wind-gall is a flatulent ſwelling, which yields to the preſſure of the finger, and recovers its ſhape on the removal thereof; the tumor is viſible to the eye, and often ſeated on both ſides of the back ſinew, above the fetlocks, on the fore-legs, but moſt frequently on the hind-legs; though they are met with in various parts of the body, wherever membranes can be ſo ſeparated, that a quantity of air and ſeroſities may be included within their duplicatures.

When they appear near the joints and tendons, they are generally cauſed by ſtrains or bruiſes on the ſinews, or the ſheath that covers them; which, by being overſtretched, have ſome of their fibres ruptured; whence probably may ooze out that fluid which is commonly found with the included air: though, where theſe ſwellings,

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† Treatiſe on the Prevention of the Diſeaſes of Horſes, p. 245.

Wind-galls Blood and Bog-Spavins.

ings ſhow themſelves in the interſtices of large muſcles, which appear blown up like bladders, air alone is the chief fluid; and theſe may ſafely be opened, and treated as a common wound.

On the firſt appearance of wind-galls, their cure ſhould be attempted by reſtringents and bandage: for which purpoſe, let the ſwelling be bathed twice a-day with vinegar, or verjuice alone; or let the part be fomented with a decoction of oak-bark, pomegranate, and alum boiled in verjuice, binding over it, with a roller, a woollen cloth ſoaked in the ſame. Some, for this purpoſe, uſe red-wine lees, others curriers ſhavings, wetted with the ſame, or vinegar, bracing the part up with a firm bandage.

If this method, after a proper trial, ſhould not be found to ſucceed, authors have adviſed the ſwelling to be pierced with an awl, or opened with a knife: but mild bliſtering has in general the preference given to theſe methods; the included fluids being thereby drawn off, the impacted air diſperſed, and the tumor gradually diminiſhed.

2. A *blood-ſpavin* is a ſwelling and dilatation of the vein that runs along the inſide of the hock, forming a little ſoft ſwelling in the hollow part, and is often attended with a weakneſs and lameneſs of the hock.

The cure ſhould be firſt attempted with the reſtringents and bandage above recommended, which will contribute greatly to ſtrengthen all weakneſſes of the joints, and frequently will remove this diſorder if early applied; but if by theſe means the vein is not reduced to its uſual dimenſions, the ſkin ſhould be opened, and the vein tied with a crooked needle and wax-thread paſſed underneath it, both above and below the ſwelling, and the turgid part ſuffered to digeſt away with the ligatures: for this purpoſe, the wound may be daily dreſſed with turpentine, honey, and ſpirit of wine, incorporated together.

3. A *bog-ſpavin* is an encyſted tumor on the inſide of the hough; or, according to Dr Bracken, a collection of browniſh gelatinous matter, contained in a bag or cyſt, which he thinks to be the lubricating matter of the joint altered, the common membrane that incloſes it forming the cyſt. This caſe he has taken the pains to illuſtrate in a young colt of his own, where he ſays, When the ſpavin was preſſed hard on the inſide the hough, there was a ſmall tumor on the outſide, which convinced him the fluid was within-ſide the joint: he accordingly cut into it; diſcharged a large quantity of this gelatinous matter; dreſſed the ſore with doſſils dipped in oil of turpentine; putting into it, once in three or four days, a powder made of calcined vitriol, alum, and bole: by this method of dreſſing, the bag ſloughed off, and came away, and the cure was ſucceſsfully completed without any viſible ſcar.

This diſorder, according to the above deſcription, will ſcarcely ſubmit to any other method, except firing, when the cyſt ought to be penetrated to make it effectual; but in all obſtinate caſes that have reſiſted the above methods, both the cure of this and of the ſwellings called *wind-galls* ſhould be attempted in this manner. If, through the pain attending the operation or dreſſings, the joint ſhould ſwell and inflame, foment it twice a-day, and apply a poultice over the dreſſings till it is reduced.

SECT. XXXIV. *Of Mallenders aud Sallenders.*

Mallenders and Sallenders.

MALLENDERS are cracks in the bend of the horſe's knee, that diſcharge a ſharp indigeſted matter; they are often the occaſion of lameneſs, ſtiffneſs, and the horſe's tumbling.

Sallenders are the ſame diſtemper, ſituated on the bending of the hough, and occaſion a lameneſs behind.

They are both cured by waſhing the parts with a lather of ſoap warmed, or old chamber-lye; and then applying over the cracks a ſtrong mercurial ointment ſpread on tow, with which they ſhould be dreſſed night and morning, till all the ſcabs fall off; if this ſhould not ſucceed, anoint them night and morning with a little of the following, and apply the above ointment over it.

TAKE hog's lard two ounces, ſublimate mercury two drams.

Or, TAKE hog's lard two ounces, oil of vitriol two drams.

Take the next from Gibſon, which is to be depended on:

ÆTHIOP's mineral half an ounce, white vitriol one dram, ſoft green ſoap ſix ounces.

Anoint with this often; but firſt clip away the hair, and clear the ſcabs. On their drying up, it may be proper to give a gentle purge or two; or the nitre-balls may be taken advantageouſly for a fortnight or three weeks.

SECT. XXXV. *Of Lampas, Barbs, and Wolves-Teeth.*

1. THE *lampas* is an excreſcence in the roof of the horſe's mouth, which is ſometimes ſo luxuriant, that it grows above the teeth, and hinders his feeding. The cure is in lightly cauteriſing the fleſh with a hot iron, taking care that it does not penetrate too deep ſo as to ſcale off the thin bone that lies under the upper bars; the part may be anointed with burnt alum and honey, which is proper for moſt ſores in the mouth.

This operation is by ſome thought to be entirely unneceſſary; it being a general obſervation with them, that all young horſes have their mouths more or leſs full of what are called *lampas*; and that ſometimes they riſe higher than the fore-teeth: but they further obſerve, in proportion as a horſe grows older, the roof flattens of itſelf, and the teeth then appear to riſe. We are obliged to the ingenious M. L. Foſſe for this remark, and hope it will be the means of aboliſhing this cruel and unneceſſary operation.

2. *Barbs* are ſmall excreſcences under the tongue, which may be diſcovered by drawing it aſide, and are cured by cutting cloſe off, and waſhing with brandy or ſalt and water.

3. A horſe is ſaid to have *wolves-teeth*, when the teeth grow in ſuch a manner, that their points prick or wound either the tongue or gums in eating. Old horſes are moſt liable to this infirmity, and whoſe upper overſhoot the under teeth in a great degree.

To remedy this evil, you may either chop off the ſuperfluous parts of the teeth with a chiſſel and mallet, or file them down, which is the better way, till you have ſufficiently waſted them.

Sect. XXXVI. *Of the Greaſe.*

In order to treat this diſorder with ſome propriety, we ſhall conſider it as ariſing from two different cauſes; a fault or relaxation in the veſſels, or a bad diſpoſition in the blood and juices. We muſt here obſerve, that the blood and juices (or humours, for there are always ſome in the beſt ſtate of blood) are brought to the extreme parts by the arteries, and returned by the veins; in which latter, the blood is to riſe in perpendicular columns, to return the circulating fluids from the extremities: hence ſwellings in the legs of horſes may eaſily be accounted for, from a partial ſtagnation of the blood and juices in the finer veſſels, where the circulation is moſt languid; and eſpecially when there is want of due exerciſe, and a proper muſcular compreſſion on the veſſels, to puſh forward the returning blood, and propel the inert and half-ſtagnating fluids through their veſſels; in ſhort, the blood in ſuch caſes cannot ſo readily aſcend as deſcend, or a greater quantity is brought by the arteries than can be returned by the veins.

The greaſe then, conſidered in this light, muſt be treated as a local complaint, where the parts affected are alone concerned, the blood and juices being yet untainted, and in good condition; or as a diſorder where they are both complicated: but when it is an attendant on ſome other diſtemper, as the farcy, yellows, dropſy, &c. ſuch diſeaſes muſt firſt be cured before the greaſe can be removed. In the former caſe, moderate exerciſe, proper dreſſing, cleanlineſs, and external application, will anſwer the purpoſe: in the latter, internals muſt be called in to our aſſiſtance, with proper evacuations.

When a horſe's heels are firſt obſerved to ſwell in the ſtable, and ſubſide or go down on exerciſe; let care be taken to waſh them very clean every time he comes in, with ſoap-ſuds, chamber-lye, or vinegar and water; which, with proper rubbing, will frequently prevent or remove this complaint: or let them be well bathed twice a-day with old verjuice, or the following mixture, which will brace up the relaxed veſſels; and if rags dipped in the ſame are rolled on, with a proper bandage, for a few days, it is moſt likely the ſwellings will be removed by this method only, as the bandage will ſupport the veſſels till they have recovered their tone. To anſwer this end alſo, a laced ſtocking made of ſtrong canvas or coarſe cloth, neatly fitted to the part, would be found extremely ſerviceable, and might eaſily be contrived by an ingenious mechanic.

Take rectified ſpirit of wine four ounces; diſſolve in it half an ounce of camphor; to which add wine-vinegar or old verjuice ſix ounces; white vitriol diſſolved in a gill of water one ounce; mix together, and ſhake the phial when uſed.

But if cracks or ſcratches are obſerved, which ooze and run, let the hair be clipped away, as well to prevent a lodgment (which becomes ſtinking and offenſive by its ſtay), as to give room for waſhing out dirt or gravel, which if ſuffered to remain there, would greatly aggravate the diſorder.

When this is the caſe, or the heels are full of hard ſcabs, it is neceſſary to begin the cure with poultices, made either of boiled turnips and lard, with a handful of linſeed powdered; or oat-meal and rye flour, with a little common turpentine and hog's lard, boiled up with ſtrong-beer grounds or red-wine lees. The digeſtive ointment being applied to the ſores for two or three days, with either of theſe poultices over it, will, by ſoftening them, promote a diſcharge, unload the veſſels, and take down the ſwelling; when may be dried up with the following:

Take white vitriol and burnt alum, of each two ounces; Ægyptiacum one ounce; lime-water a quart or three pints: waſh the ſores with a ſponge dipped in this three times a-day; and apply the common white ointment ſpread on tow, to an ounce of which may be added two drams of ſugar of lead.

This method is generally very ſucceſsful when the diſtemper is only local, and requires no internal medicines; but if the horſe be full and groſs, his legs greatly gorged, ſo that the hair ſtares up, and is what ſome term pen-feathered, and has a large ſtinking diſcharge from deep foul ſores, you may expect to meet with great trouble, as theſe diſorders are very obſtinate to remove, being often occaſioned by a poor dropſical ſtate of blood, or a general bad diſpoſition in the blood and juices.

The cure in this caſe, if the horſe is full and fleſhy, muſt be begun by bleeding, rowels, and repeated purging; after which, diuretic medicines are frequently given with ſucceſs. Thus,

Take four ounces of yellow roſin, one of ſal prunellæ; grind them together with an oiled peſtle; add a dram of oil of amber; and give a quart of forge-water every morning, faſting two hours before and after taking, and ride moderately.

As this drink is found very diſagreeable to ſome horſes, we would recommend the nitre-balls in its ſtead, given to the quantity of two ounces a-day for a month or ſix weeks, mixed up with honey or in his feeds. Take the following alſo for that purpoſe; or the diuretic balls directed under *Diſorders of the Eyes*.

Yellow roſin four ounces; ſalt of tartar, and ſal prunellæ, of each two ounces; Venice ſoap half a pound; oil of juniper, half an ounce; make into balls of two ounce weight, and give one every morning.

The legs in this caſe ſhould be bathed or fomented, in order to breathe out the ſtagnant juices, or to thin them, ſo that they may be able to circulate freely in the common current. For this purpoſe, foment twice a-day with the diſcutient fomentation (p. 143. col 2.), in which a handful or two of wood-aſhes has been boiled; apply then the above poultices, or the following, till the ſwelling has ſubſided, when the ſores may be dreſſed with the green ointment till they are properly digeſted, and then dried up with the water and ointment above recommended.

Take honey one pound; turpentine ſix ounces; incorporate with a ſpoon; and add of the meal of fenugreek and linſeed each four ounces; boil in three quarts of red-wine lees to the conſiſtence of a poultice; to which add, when taken from the fire, two ounces of camphor in powder; ſpread it on thick cloths, and apply warm to the legs, ſecuring it on with a ſtrong roller.

If the ſores are very foul, dreſs them with two parts of the wound-ointment, and one of Ægyptiacum; and apply the following, ſpread on thick cloths, and rolled on.

Take of black ſoap, one pound; honey half a pound; burnt alum four ounces; verdigreaſe powdered two ounces; wheat flour a ſufficient quantity.

If the diuretic balls ſhould not ſucceed, they muſt be changed for the antimonial and mercurial alteratives, already mentioned; but turning a horſe out in a field, where he has a hovel or ſhed to run at pleaſure, would greatly contribute to quicken the cure, and indeed would in general effect it alone; but if this cannot be complied with, let him be turned out in the day-time.

If the horſe is not turned out, a large and convenient ſtall is abſolutely neceſſary, with good dreſſing and care.

The laſt thing we ſhall recommend, is a method to oblige a horſe to lie down in the ſtable. This undoubtedly is of the utmoſt conſequence, as it will not a little contribute to the removal and cure of this diſorder; for by only changing the poſition of his legs, a freer circulation would be obtained, and the ſwelling taken down; whereas in general it is greatly aggravated by the obſtinacy of the horſe, who refuſes to lie down at all (probably from the pain it gives him to bend his legs for that purpoſe), by which means the ſtiffneſs and ſwelling increaſes, till the over-gorged and diſtended veſſels are obliged to give way; and by burſting, diſcharge the fluids, which ſhould circulate through them.

Sect. XXXVII. *Of Scratches, Crown-ſcabs, Rat-tails, and Capellets.*

1. Scratches in the heels have ſo much affinity with the greaſe, and are ſo often concomitants of that diſtemper, that the method of treating them may be ſelected chiefly from the preceding ſection; which at firſt ſhould be by the linſeed and turnip poultice, with a little common turpentine, to ſoften them and relax the veſſels; the green ointment may then be applied for a few days to promote a diſcharge, when they may be dried up with the ointments and waſhes recommended in the above ſection. It is beſt afterwards to keep the heels ſupple, and ſoftened with currier's dubbing, which is made of oil and tallow. This will keep the hide from cracking, and be as good a preſervative as it is to leather; and, by uſing it often before exerciſe, will prevent the ſcratches, if care is taken to waſh the heels with warm water when the horſe comes in: When they prove obſtinate, and the ſores are deep, uſe the following; but if any cavities or hollow places are formed, they ſhould firſt be laid open; for no foundation can be laid for healing till you can dreſs to the bottom.

Take Venice turpentine four ounces; quickſilver one ounce; incorporate well together by rubbing ſome time; and then add honey and ſheeps ſuet of each two ounces.

Anoint with this once or twice a-day; and if the horſe is full or fleſhy, you muſt bleed and purge; and if the blood is in a bad ſtate, the alteratives muſt be given to rectify it.

2. The *crown ſcab* is a humour that breaks out round the coronet, which is very ſharp and itching, and attended with a ſcurfineſs: ſharp waters prepared with vitriol are generally uſed for the cure; but the ſafeſt way is firſt to mix marſhmallow and yellow baſilicon, or the wound-ointment, equal parts, and to ſpread them on tow, and lay all round the coronet. A doſe or two of phyſic may be very proper, with the diuretic medicines preſcribed in the preceding page, and the alteratives above recommended, in rebellious caſes. *Vide* the Section on *Alteratives.*

3. *Rat-tails* are excreſcences which creep from the paſtern to the middle of the ſhanks, and are ſo called from the reſemblance they bear to the tail of a rat. Some are moiſt, others dry; the former may be treated with the drying ointment and waſhes, p. 153. col. 2. par. 1. the latter with the mercurial ointment preſcribed in the Section of *Strangles*, p. 129. col. 2. If the hardneſs does not ſubmit to the laſt medicine, it ſhould be pared off with a knife, and dreſſed with turpentine, tar, and honey, to which verdigreaſe or white vitriol may occaſionally be added; but before the uſe of the knife, you may apply this ointment.

Take black ſoap four ounces, quick lime two ounces, vinegar enough to make an ointment.

4. There are particular ſwellings which horſes are ſubject to, of a wenny nature, which grow on the heel of the hock, and on the point of the elbow, and are called by the French and Italians *capellets:* they ariſe often from bruiſes and other accidents; and when this is the caſe, ſhould be treated with vinegar and other repellers. But when they grow gradually on both heels or elbows, we may then ſuſpect the blood and juices in fault, and that ſome of the veſſels are broke and juices extravaſated: in this caſe the ſuppuration ſhould be promoted, by rubbing the part with marſhmallow ointment; and when matter is formed, the ſkin ſhould be opened with a lancet in ſome dependent part towards one ſide, to avoid a ſcar; the dreſſings may be turpentine, honey, and tincture of myrrh. The relaxed ſkin may be bathed with equal parts of ſpirit of wine and vinegar, to which an eighth part of the oil of vitriol may be added. The contents of theſe tumors are various; ſometimes watery; at others ſuety, or like thick paſte; which, if care be not taken to digeſt out properly with the cyſt, will frequently collect again. Was it not for the disfigurement, the ſhorteſt method would be to extirpate them with a knife, which if artfully executed, and the ſkin properly preſerved, would leave very little deformity.

Sect. XXXVIII. *Of Ruptures, Anticor Diſeaſes of the Mouth, aud Colt-evil or Gonorrhœa.*

1. In regard to *ruptures*, though they are generally divided into particular claſſes, we ſhall only obſerve, that by violent efforts of the horſe, or other accidents, the guts or caul may be forced between the muſcles of the belly at the navel, and through the rings of the muſcles into the ſcrotum or cod. The ſwellings are generally about the ſize of a man's fiſt, ſometimes much larger, deſcending to the very hock: they are frequently ſoft, and yield to the preſſure of the hand, when they will return into the cavity of the belly with a rumbling noiſe: and, in moſt, the vacuity may be felt through which they paſſed.

On their firſt appearance, endeavours ſhould be made to

Ruptures, Anticor, &c.

to return them by the hand ; but if the ſwelling ſhould be hard and painful, in order to relieve the ſtricture, and relax the parts through which the gut or caul has paſſed, let a large quantity of blood be immediately taken away, and the part fomented twice or thrice a-day, applying over it a poultice made of oatmeal, oil, and vinegar, which ſhould be continued till the ſwelling grows ſoft and eaſier, or the gut is returned. In the mean time, it would be proper to throw up emollient oily glyſters twice a-day, and to let the horſe's chief diet be boiled barley, ſcalded malt, or bran.

Should the ſwelling afterwards return, we apprehend the reſtringent applications, uſually recommended on theſe occaſions, will avail little without a ſuſpenſory bandage ; ſo that an ingenious mechanic in that art is chiefly to be relied on for any future aſſiſtance ; though it has been obſerved, that with moderate feeding, and gentle exerciſe, ſome horſes have continued to be very uſeful under this complaint.

2. The *anticor* is a diſorder not very common among our horſes, or thoſe in nothern climates ; but is particularly taken notice of by the French, Spaniſh, and Italian writers ; who deſcribe it a malignant ſwelling in the breaſt, which extends ſometimes to the very ſheath under the belly ; it is attended with a fever, great depreſſion and weakneſs, and a total loſs of appetite.

The cure ſhould be firſt attempted by large and repeated bleedings, to abate the inflammation ; emollient glyſters ſhould be injected twice or thrice a-day, with an ounce of ſal prunella in each, and the cooling drink, in the Section on *Fevers*, ſhould be given inwardly : the ſwelling ſhould be bathed with the marſhmallow ointment ; and a ripening poultice, with onions boiled in it ſhould be applied over it. If by this method, continued four or five days, the inflammation in the throat and gullet is removed, our attention ſhould more particularly turn to encourage the ſwelling at the breaſt, and bring it, if poſſible, to matter : to which end, continue the poultice, and give two ounces of Venice treacle diſſolved in a pint of beer every night ; when the ſwelling is grown ſoft, it muſt be opened with the knife, and dreſſed with turpentine digeſtive, the danger now being over.

But ſhould it be found impracticable to bring the ſwelling to matter, and it increaſes upwards, ſo as to endanger ſuffocation ; authors have adviſed to pierce the tumor with a hot pointed cautery in five or ſix places ; to dreſs with the above digeſtive ; and, in order to ſtimulate and promote a greater diſcharge, to add to it a ſmall quantity of Spaniſh flies and euphorbium in powder ; fomenting at the ſame time, and bathing the circumjacent parts with ointment of marſhmallows. M. Gueriniere, as well as Soleyſel, have adviſed opening the ſkin, when the tumor cannot be brought to matter, in order to introduce a piece of black hellebore-root ſteeped in vinegar, and to confine it there for 24 hours : this alſo is intended as a ſtimulant ; and is ſaid to anſwer the intention, by occaſioning ſometimes a ſwelling as big as a man's head.

3. Beſides the diſorders of the mouth, which we have already animadverted on, there are frequently obſerved on the inſide the lips and palate, little ſwellings or bladders called *giggs*. Slitting them open with a knife or lancet, and waſhing them afterwards with ſalt and vinegar, is in general their cure : but when they degenerate into what are called *cankers*, which are known by little white ſpecks, that ſpread and occaſion irregular ulcers, the beſt method then is to touch them daily with a ſmall flat cautery, moderately heated till the ſpreading is ſtopped, and to rub the ſores three or four times a-day with Ægyptiacum, and tincture of myrrh ſharpened with oil or ſpirit of vitriol ; when by this dreſſing the ſloughs are ſeparated, they may be waſhed frequently with a ſponge dipped in copperas, or ſublimate water, if they continue to ſpread ; or a tincture made by diſſolving half a ounce of burnt alum, and two ounces of honey, in a pint of tincture of roſes. Either of theſe will dry them up, and are very uſeful in moſt diſorders of the mouth.

Ruptures, Anticor, &c.

A relaxation and ſwelling of the palate ſometimes happens to horſes on catching cold. To remedy this diſorder, blow pepper on the part, or anoint it with the ſame mixed up with honey. The tincture abovementioned may be uſed for this purpoſe, to which may be added half an ounce of ſpirit of ſal ammoniac.

4. The *colt-evil* is ſuppoſed to ariſe from ſtoned colts having full liberty with mares, before they are able to cover them ; whence frequently enſues an excoriation or fretting on the glands and a ſwelling on the ſheath. This laſt diſorder frequently proceeds too from dirt or filth lodging there, and is often removed by waſhing the part clean with butter and beer : but when the yard itſelf is ſwelled, foment it twice a-day with marſhmallows boiled in milk, to which may be added a little ſpirit of wine ; anoint the excoriation with the white ointment, or waſh it with a ſponge dipped in lime, to a pint of which may be added two drams of ſugar of lead : the yard ſhould be ſuſpended up to the belly ; and if the ſwelling ſhould increaſe with the inflammation, bleed, and give the cooling phyſic, anoint with ointment of alder, and apply the bread-and-milk poultice.

If a ſimple gonorrhœa or ſeminal gleet is obſerved to drip from the yard (which is often the caſe in high-fed young horſes, where a relaxation of the glands and ſeminal veſſels has been brought on by frequent emiſſions), let the horſe be plunged every day into a river or pond ; give him two or three rhubarb purges, at proper diſtances ; and intermdiately the following balls.

> TAKE of balſam of copivi, or Venice turpentine, olibanum, and maſtich powdered, of each two drams ; bole armeniac, half an ounce : mix up into a ball with honey, and give it night and morning till the diſcharge leſſens, and then every night till it goes off.

Balls prepared with rhubarb and turpentine may alſo be given for this purpoſe ; two drams of the former with half an ounce of the latter.

SECT. XXXIX. *Preliminary Remarks on* DISEASES *of the* FEET.

I. *Of Greaſing, Oiling, and Stuffing Horſes Hoofs.* The cuſtom of keeping our fineſt horſes conſtantly ſtanding upon dry litter and hot dung in the ſtable, is exceedingly hurtful to the feet and legs, particularly the former, which are always found to agree beſt with coolneſs and moiſture. Hence we find, that horſes hoofs, whilſt running in the fields, are always in better condition than thoſe that are kept hot and dry in the ſtable, which, beſide being liable to many diſeaſes, are hard, brittle, ſhattered, and often broken.

With reſpect to greaſy or oily applications, ſo often preſcribed for the hoofs of horſes in order to preſerve them ſound, tough, &c. Mr Clark * very juſtly condemns them as rather pernicious than ſalutary.

When young horſes (he obſerves) are firſt taken from the fields, their hoofs are cool, ſound, and tough. Theſe are found from experience to be good qualities. But horſes are no ſooner introduced into the ſtable, than their hoofs are greaſed or oiled two or three times a-week: and if they are kept much in the houſe ſtanding upon hot dry litter, without being frequently led abroad, and without having an opportunity of getting their hoofs cooled and moiſtened in wet ground, their hoofs grow ſo brittle, dry, and hard, that pieces frequently break off, like chips from a hard ſtone; and, when driving the nails in ſhoeing, pieces will ſplit off, even although the nails are made very fine and thin. Now, if theſe ſame horſes with brittle ſhattered hoofs are turned out to graze in the fields, their hoofs in time will become, as they were originally, ſound, tough, and good.

This change muſt undoubtedly be aſcribed to the wet and moiſture which the hoofs are expoſed to in the fields, of which water is the principal ingredient; and it is a certain fact, of which we have daily proofs, that when all other means fail, horſes are turned out to graſs in order to recover their decayed brittle hoofs. It is known, that the hoofs of horſes, are porous; and that inſenſible perſpiration is carried on through theſe pores, in the ſame manner, and according to the ſame laws, as take place in other parts of the body. Now, every body knows, that greaſy or oily medicines applied to the ſkin of the human body, prevent perſpiration, which is frequently attended with the worſt conſequences. The ſame reaſoning will hold with reſpect to the hoofs of horſes; for greaſy or oily applications cloſe or ſhut up the pores of the hoof, by being abſorbed or ſucked into its inner ſubſtance. Hence the natural moiſture which ſhould nouriſh the hoof, is thereby prevented from arriving at its ſurface; which, on that account, becomes as it were dead, and conſequently dry, brittle, and hard.

The original practice of greaſing or oiling horſes hoofs, had probably taken its riſe, from obſerving, that greaſe or oil ſoftened dead ſubſtance, ſuch as leather, &c. But this will by no means apply to the hoofs of horſes, as there is a very great difference between the living and dead parts of animals; the former having juices, &c. neceſſary for their own nouriſhment and ſupport, whilſt the latter require ſuch applications as will preſerve them from decaying and rotting.

The dealers in horſes about London, when they get a bad-footed horſe in their hands, moiſten his hoofs frequently in water; for which purpoſe they keep a puddle of water and dung at the watering place, that when the horſe comes to water, his fore-feet may be ſunk in the puddle, by which means they are cooled and moiſtened twice or thrice every day; ſo that, whilſt they are making up his carcaſe for the market, his hoofs are likewiſe repaired, and ſufficient to ſtand the teſt of a trial upon ſale. But no ſooner do horſes with hoofs of this kind come into other hands, their hoofs at the ſame time being kept dry and greaſed, &c. than they degenerate into their former ſtate. Hence, the cauſe of ſo many complaints that horſes turn ſoon lame after they come from dealers, when, in fact, it proceeds from greaſy applications, and neglecting to cool or moiſten the hoofs in water; for the careful groom, when airing his maſter's horſes, rather than lead them into a puddle, will go about in order to keep their feet clean and dry.

Another practice equally pernicious, is the ſtuffing up horſes hoofs (as it is called) with hot reſinous, and greaſy mixtures, under the notion of cooling and ſoftening them. Various are the preſcriptions recommended for this purpoſe, many of which are of a quite oppoſite nature to the purpoſe intended.——There is likewiſe a great impropriety in ſtuffing up the hoofs with rotten dung and ſtale urine: this, it is true, is moiſture; but of the very worſt kind, on account of the ſalts contained in the urine, which of itſelf greatly contributes towards hardening and drying their hoofs, in place of ſoftening them; beſides the other bad effects which may ariſe to the frog, &c. from the rottenneſs of the dung. But, without commenting upon the various compoſitions or pompous preſcriptions recommended in books, or thoſe handed about as receipts for the ſoftening and ſtuffing horſes hoofs, the author would recommend one which is more natural, and ought not to be deſpiſed for its ſimplicity, as it is only cooling and moiſtening the hoofs with water morning and evening: And, to thoſe who are fond of ſtuffing, he would preſcribe bran and water, or clay, &c. made into the conſiſtency of a poultice; and, in particular caſes, where horſes ſtand much in the ſtable, and the hoofs are diſpoſed to be very hard, dry, and brittle, a poultice of this kind, or any other emollient compoſition in which water is a principal ingredient, may be applied all round the hoof; or, in imitation of ſome dealers, to keep a puddle of water at the watering-place, which will anſwer equally well, if not better. From this manner of treatment, the hoofs will be preſerved in their natural ſtate, and a free and equal perſpiration kept up, by which the nouriſhment natural to the hoof will have free acceſs to its ſurface, as it is this only which cauſes that coheſion of the parts which conſtitutes a firm, ſound, tough hoof.

II. *Of the natural Defects of the Feet.* It is very well known, that different climates and different ſoils greatly affect the feet of horſes. Thoſe that are bred in hot countries, ſtanding moſtly upon dry ground, have deep cruſted hollow hoofs with ſmall frogs; for, being but little expoſed to wet or moiſture, the fibres of the hoof contract more cloſely. And, even in Great-Britain, there is a conſiderable difference, according to the dryneſs or wetneſs of the ſoil upon which horſes are bred. Thoſe that are bred upon the mountainous parts of England and Wales, and in the northern parts of Scotland, have generally good ſound tough hoofs; whilſt thoſe horſes that are bred upon low marſhy grounds (which are moſtly of the big draught kind), have flat, large, ſoft hoofs; for being kept too moiſt, by always ſoaking in wet, the horny fibres of the hoof are too much relaxed.

Thoſe hoofs which are either too large or too ſmall, in proportion to the ſize of the body, and thickneſs of the bones of the legs, are generally, and not without foundation, looked upon as bad. Large broad hoofs, for the moſt part, have thin flat ſoles; large, ſoft, ſpongy frogs: a ſtrong cruſt, ſomething hollow upon the upper and fore part, and full of wrinkles or rings, not unlike the rough outſide of an oyſter-ſhell. Hoofs of this ſhape are liable to that diſeaſe termed *foundered*; and to have high, round, or ſwelled ſoles, and low weak heels, &c.

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* *Obſervations on the Shoeing of Horſes, and on the Diſeaſes of their Feet*; from which judicious performance the following ſections are extracted.

Small hoofs are liable to the oppoſite extreme, eſpecially thoſe of that kind which generally go under the denomination of *aſſes hoofs*, as they are deep cruſted and narrow, the ſole very hollow, the frog ſmall, the heels high and ſtrong, the cruſt upon the outſide clear and ſhining; theſe are naturally diſpoſed to a contraction of the whole hoof which is called *hoof-bound*; and likewiſe to corns, running thruſhes, or fruſhes either of which render a horſe lame.

Some hoofs are pretty well proportioned, and look well to the eye; but, at the ſame time, they are thin and weak cruſted, and not able to ſtand much fatigue in travelling upon hard ſtoney grounds. On the other hand, very ſtrong cruſted hoofs are by no means the beſt, but are liable to cracks, &c. In ſuch hoofs, the horny fibres appear very diſtinct, and run in a ſtraight line from the coronet or top of the hoof to its baſis, reſembling the grain of ſome kinds of wood, particularly oak. Hence they are diſpoſed to cracks or fiſſures, which cleave the hoof quite through, ſometimes from the coronet down to the bottom of the hoof. In others, theſe cracks at firſt do not penetrate through the horn, but appear like a ſeam on the ſurface of the hoof, commonly named a *ſand-crack*; which, from retaining the ſand and gravel, at laſt works its way into the quick, and occaſions lameneſs, &c. Another diſadvantage attending very ſtrong cruſted hoofs is, that, when they ſtand long in a dry hot ſtable, they contract, and by their thickneſs and hardneſs bruiſe the internal parts of the foot. Hence the horſe will be lame, though, at the ſame time, no viſible defect will be ſeen about the hoof, excepting a great heat, pain, and tenderneſs in his feet; the true cauſe of which is ſeldom attended to or known; and hence the horſe is ſaid to be lame in ſome other part, perhaps the ſhoulders. Low thin heels are weak-cruſted, and liable to lameneſs from injudicious ſhoeing. The oppoſite extreme, *viz.* very high heels, is equally bad; as theſe are ſubject to corns, and contraction of the hoof; and the deepneſs of the cruſt cauſes a numbneſs in the feet, and unſteadineſs in the horſe's going, which make him liable to trip and ſtumble.

Much has been ſaid by authors, with reſpect to the different colours of horſes hoofs, aſcribing different qualities, and temperaments to peculiar colours, ſuch as hardneſs, dryneſs, brittleneſs, &c. But it is very well known to practitioners in ſhoeing horſes, that there are good and bad hoofs of all colours; ſome being naturally weak and diſpoſed to be brittle, whilſt others are tough and ſtrong. But a great deal depends upon the management of them in the ſtable, in keeping them properly moiſtened, in order to preſerve a due medium between theſe oppoſite extremes. It likewiſe generally remarked by authors, as a ſure ſign of bad thin hoofs, that, when the ſhoe-nails are drove high up in the cruſt, it is, ſay they, an evidence that the cruſt is thin, and that there was not ſufficient hold, without driving the nails high up. But this can be no true criterion to judge by; for, if the nails can be driven high up in the cruſt with ſafety in a thin weak foot, the ſame may as certainly be done in a ſtrong foot, with more eaſe and expedition, which indeed is frequently the caſe.

To form a right judgment of what may be called a *good hoof*, it muſt neither be too large nor too ſmall in proportion to the ſize of the leg: at the ſame time, its ſhape muſt be regular, gradually enlarging from the coronet towards its baſis; the cruſt ſmooth, even, and free from ſeams, cracks, or wrinkles; the ſole ſtrong, and a little hollow; the heels firm and open; the frog tough, ſound, and dry.

Sect. XL. *Wounds in the Feet.*

Wounds in the feet happen frequently, but chiefly from want of proper care, and treating them injudiciouſly when they are firſt inflicted.

1. Wounds upon the coronet, or top of the hoof, when ſuperficial, are eaſily cured, if not neglected or improperly treated. But the moſt ſimple wound, by bad management or neglect, may, eſpecially if the horſe ſhould happen at the time to be in a bad habit of body, be attended with dangerous conſequences: therefore, however trifling they may at firſt appear, they ſhould be treated with attention.

When large deep wounds are inflicted upon the coronet, from which may be apprehended a great inflammation, and its conſequences; to prevent theſe evils as much as poſſible, it will be neceſſary to have recourſe to bleeding, and at the ſame time to give ſuch internal remedies as are recommended in inflammatory caſes; cooling ſalts, glyſters, &c. together with a low ſoft diet, keeping the hoof moiſt and ſoft with emollient poultices applied around it, which may be made of turnip, mallows, or even bran and water.

Deep wounds upon the coronet are generally made by long ſharp caukers upon the heels of the ſhoes of the oppoſite foot, penetrating downwards between the coffin-bone and the hoof. In this caſe, as there is no depending orifice or paſſage for the matter contained in the wound to be diſcharged downwards, there is great danger of a fiſtula or ſinuous ulcer being formed; to prevent which, an artificial drain or opening muſt be made through the hoof, firſt raſping or paring it very thin upon the outſide where the perforation is to be made; then introduce a ſharp-pointed inſtrument, a little bent, into the orifice of the wound, and, paſſing it to the bottom, force it outwards. This operation will be performed with leſs pain to the animal, if the inſtrument be concealed within a canula or hollow tube, till it reaches to the bottom of the wound; when the perforation is to be made by puſhing it beyond the extremity of the canula; and, by applying a bandage pretty tight round the coronet, the ſides or lips of the wound may be brought into contact and healed up, or a ſeton may be introduced, and continued till the inflammation, ſwelling, &c. are removed. If this operation be too long delayed, the matter confined in the wound forms a number of ſinuſes or fiſtulæ, which frequently run in different directions under the hoof, and require a large portion of it to be cut away before they can be healed up, leaving an ugly blemiſh, and a weakneſs or tenderneſs on that part of the hoof, which never admits of a thorough cure. But,

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Wounds in the Feet.

by treating it in the manner now mentioned, the annular ligament may be preſerved entire, and a falſe quarter avoided: and, although there may remain an horizontal crack or fiſſure in the hoof where the perforation was made; yet, as the hoof grows downward, it will likewiſe go along with it, and wear out, without leaving a blemiſh or any other bad conſequence.

When the capſular ligament of the coffin-joint is wounded or perforated by any inſtrument, ſo as to admit the external air into its cavity, the glands there ſituated inflame; and, in place of ſecreting a lubricating mild liquor, they diſcharge a ſharp ichorous fluid, which deſtroys and corrodes the very cartilages or griſtles upon the ends of the articulated bones, which at laſt grow together, and form what is termed an *anchyloſis*, and of courſe lameneſs. There are many farriers who boaſt of their having cured wounds in the joints after they were affected with that ſymptom which they call a *joint-water*, that is, a diſcharge of the ſynovia or mucilaginous fluid contained within the cavity of the joint. But what they commonly call a *joint-water*, is only a yellow ſerum or lymph, which is frequently to be met with iſſuing in great abundance from wounds in the legs; and not the ſynovia or fluid contained within the cavity of the joint. Notwithſtanding wounds of this kind happen frequently; yet, ſo little are the generality of practitioners acquainted with the nature of them and their conſequences, that they make no diſtinction betwixt them and thoſe of a more ſimple nature. Hence, therefore, they find themſelves frequently miſtaken in prognoſticating the cure of a wound, to appearance of a very ſimple nature.

It is a certain fact, confirmed by experience, that when the capſular ligament of any joint is perforated or cut through, there is but little chance of a complete cure being effected, ſo as the horſe may be uſeful for the ſaddle or carriage; although, in other reſpects, to thoſe who are willing to be at the expence, he may, if a ſtrong horſe, be uſeful in ſome kinds of drudgery.

As to the mode of dreſſing wounds of this kind, all that art can do, is to prevent as much as poſſible, a violent inflammation or flux of humours to the affected limb, by blooding, glyſters, cooling ſalts, together with a low ſoft diet applying digeſtive poultices to the wound, and injecting now and then into the cavity of the joint tincture of myrrh.

2. Wounds upon the coronet towards the back part of the foot or heel, which are commonly called an *over-reach*, are occaſioned by the toe of the hind-ſhoe on the ſame ſide cutting the fore-heel. Some horſes are much addicted to this, owing entirely to their manner of going, *viz.* the hind-foot moving in the ſame line of direction with the fore-foot; in riding faſt, the fore-foot not giving place in time, the hind-foot ſtrikes againſt the fore-heel: hence ſome horſes, in trotting, make a clattering noiſe with the hind-ſhoes ſtriking againſt the heel of the fore ones; hence, likewiſe, many horſes are thrown down by the ſame cauſe.

Although an over-reach is a wound of the complicated kind, being at the ſame time a contuſion or bruiſe together with a wound: yet they are nowiſe dangerous, and are eaſily cured by treating them in the manner hereafter mentioned; for, in two or three days, when the wound comes to ſuppurate properly, the bruiſed or dead parts fall off, and only leave a larger ſurface of a wound than was at firſt apprehended.

Wounds in the Feet.

With reſpect to the dreſſing proper for recent wounds, farriers are too much prejudiced in favour of certain balſams, ointments, and tinctures; and too ſanguine in the belief of their ſuppoſed ſpecific virtues, the healing qualities of which they flatter themſelves are irreſiſtible. But the truth is, all that art can do in the healing of wounds, is to remove every impediment which may obſtruct the uniting of the divided parts, and to forward the formation of laudable pus or matter; that being once effected, the reſt is performed by nature, which is ſelf-ſufficient. All the balſams and remedies which are ſaid to generate new fleſh, in fact only aſſiſt nature by excluding the external air, keeping the wounded parts warm and confining the ſecreted humours, which by remaining there a due time, are converted into laudable matter, which is the balſam of nature's preparing. Therefore, the moſt approved and rational method of treating recent wounds is, to endeavour to bring them to a ſuppuration or diſcharge of laudable matter; for which purpoſe, poultices are moſt eligible, as they may be eaſily made more or leſs of a digeſtive quality, by melting and mixing any proper digeſtive ointment with the poultice whilſt warm.

Digeſtive ointment. TAKE common terpentine and hog's lard, of each equal parts, melted together.

This ointment may be made ſtronger or weaker, by diminiſhing the one ingredient and increaſing the other; and is very proper to be mixed with poultices, in order to keep them ſoft and pliable.

Digeſtive Poultice. TAKE oat-meal or coarſe wheat-flour; digeſtive ointment, two ounces; beer-grounds, a ſufficient quantity: boil the whole to the conſiſtence of a poultice. The quantity of the ointment may be increaſed or diminiſhed in proportion to the ſize of the poultice.

The experience the author has had of the good effects of poultices of this kind in recent wounds, makes him recommend them as preferable to any other mode of dreſſing, for promoting a quick ſuppuration, and leaving a ſmooth even cicatrix.

3. *Emollient Poultice.* TAKE oat-meal, or coarſe flour, and linſeed powdered, of each half a pound. Boil them in milk or water to the conſiſtence of a poultice: to which add of ſal ammoniac, in powder, one ounce.

This emollient poultice may be applied when there is a great heat, inflammation, or ſwelling, attending wounds; and by the addition of freſh butter, lard, or oil, may be made of a more relaxing nature.

Many people are indeed prejudiced againſt the uſe of poultices, from a wrong notion, that they (as the phraiſe is) draw humours to be wounded part; but the abſurdity of this way of reaſoning will be evident to thoſe who are acquainted with the healing art.

"Poultices (ſays Mr Barlett) are of ſuch real and extenſive uſe in farriery, that we thought the compoſition of them could not be too general. How ſimple ſoever the ingredients may appear to ſome (which are generally at hand), yet they will be found to anſwe moſt

Wounds in the Feet.

moſt intentions, where preſent eaſe is to be obtained by warmth, ſoftening, and relaxing the injured part. Many are the caſes which demand ſuch aſſiſtance, as recent ſwellings, inflammations, treads, bruiſes, cracked and ſwelled heels and feet, burns, ſcalds, bruiſed and lacerated wounds from ſtumps, thorns, glaſs, nails, &c. which laſt are much better treated with ſuch ſimple emollient applications, than by hot oils or ſcalding plaſters dropt into the wounds; which, under the abſurd notion of drawing, but too often ſear up the mouths of the veſſels, hinder digeſtion, and conſequently increaſe both pain and inflammation. In ſhort, it is certain that very great ſervices are daily done by the uſe of poultices, not only in thoſe diſorders to which the human body is incident, but alſo in thoſe wherewith the brute part of the creation is afflicted. One advantage which they have over moſt outward applications is peculiar to them, that they convey and retain an additional heat, beſides what is often in the ingredients; and as moſt of them have alſo ſomething emollient in their compoſition, they muſt neceſſarily ſoften and relax the ſkin and veſſels, abate tenſion, attenuate and thin viſcid and obſtructed juices, ſo that their return into the common courſe of circulation, or diſcharge by the pores of the ſkin, muſt in general be much better anſwered by poultices than by other methods."

Poultices may be continued till ſuch time as the wound appears to be well digeſted (that is, a kindly ſuppuration of white well-concocted matter), look ſmooth and equal, free from cavities or excreſcences of proud fleſh; in that caſe, the uſe of poultices may be left off, and the ſurface of the wound may be ſprinkled over with the following mild eſcharotic powder.

> TAKE burnt limeſtone, that breaks down on being expoſed to the air without water, three ounces; Armenian bole, one ounce; rubbed together in a mortar, and put through a fine ſieve.

After the wound is ſprinkled with this powder, a pledget of dry lint may be fixed gently over it; and, when the ſurface of the wound is nearly equal with the ſkin, the powder will be ſufficient, without any cloth or covering.

3. There is another ſpecies of wounds to which the feet are much expoſed, called *punctures*, on account of their ſmall orifice, as the parts immediately after the wound is inflicted readily cloſe up, whereby it becomes difficult to know the depth of the wound. They are generally occaſioned from treading upon ſharp ſtones, broken glaſs, ſharp bones, and nails, and likewiſe from nails in ſhoeing; either of theſe perforating the ſole or frog, and wounding the internal parts of the foot; which, from their ſituation and confinement within the hoof, are attended with the moſt violent pain and inflammation, which are frequently increaſed by the injudicious method generally obſerved in treating theſe wounds when firſt inflicted, by the application of hot corroſive oils poured into the recent wound, in order to deaden it, which is productive of the worſt of conſequences. Thus, a fine young chaiſe-horſe, upon a journey, was pricked with a nail in ſhoeing; which being immediately obſerved, the farrier poured into the wound oil of vitriol. The horſe continued very lame; and, upon the third day, he gave up, not being able to travel any longer. The leg, immediately above the hoof, ſwelled to a moſt enormous ſize, broke out in different places, and diſcharged an incredible quantity of bloody matter, by which the whole limb was waſted, and the horſe rendered entirely uſeleſs.

Wounds in the Feet.

Punctures or pricks from nails in ſhoeing, are commonly ſaid to proceed from ignorance or blundering. This may ſometimes be the caſe; but, at the ſame time, it is an accident that may, and indeed does, happen to the moſt expert artiſt; and it is ſurpriſing, conſidering the narrow ſpace there is in ſome hoofs for driving nails, that it does not happen more frequently. When it is diſcovered in time, it is eaſily cured by opening a paſſage for the matter downwards, and dreſſing it with any digeſtive ointment or poultice, and keeping the foot moiſt, by applying an emollient poultice all round the hoof. But when it is overlooked, or a fragment of the nail remains in the wound, the inflammation increaſing, it at laſt ſuppurates. The matter accumulating, and not finding a paſſage downwards, from the natural formation of the hoof, it moves upwards to the coronet or top of the hoof, and forms a round tumour, which afterwards breaks out and degenerates into a moſt malignant ulcer, commonly termed,

4. A *Quittor-bone*. This tumor is attended with great pain and inflammation, and a conſiderable ſwelling round its baſis. The method of cure commonly practiſed, and indeed recommended by authors, eſpecially Dr Braken, is to bore a number of holes into the ſubſtance of the tumor with a hot iron, pointed pyramidally; and to introduce into theſe holes ſmall pieces of corroſive ſublimate (ſome even uſe arſenick), which corrodes and deſtroys the fleſh for ſome ſpace around them, and at laſt ſeparates from the ſound parts, in a hardened maſs of dead mortified fleſh, called a *core*, which falls off and leaves a large ſurface of a wound. But, frequently, a ſecond or ſometimes a third operation is found neceſſary, before the fiſtula or ſinus can be opened to the bottom, and the proud fleſh totally overcome, which grows very luxuriantly, and renders the cure tedious, uncertain, and very painful to the animal. Therefore, as this method of cure is attended with ſo many inconveniences, and is even dangerous from the quantity of ſublimate, &c. made uſe of, which may as readily deſtroy the ligament of the joint, bones, &c. as the ſubſtance of the tumor, it ought never to be uſed but with caution, and when other means have failed, as it likewiſe endangers the life of the horſe. The knife ſeems far preferable: firſt tie a ligature round the fetlock, in order to ſtop the bleeding; and, with a crooked ſharp knife, cut out the tumor to the bottom; afterwards dreſs it like a freſh wound till it is healed up.

In ulcers of this kind, as there are a number of ſinuſes or fiſtulæ which run in different directions underneath the hoof, it is hardly poſſible to avoid deſtroying the annular ligament which lies below the coronet, and cutting away a large portion of the hoof; yet, in many caſes (eſpecially when there is an opening in the tumor), the method propoſed, at the beginning of this ſection, for curing the deep wounds upon the coronet with ſeton, may be firſt tried; and, if that does not ſucceed, either of the operations abovementioned may be performed.

Punctures differ little or nothing, in the manner of treating them, from wounds: only the ſole or frog ſhould be ſcraped thin all round the orifice of the wound, which, at the ſame time, if too ſmall, ſhould be enlarged, and the digeſtive poultice applied, taking care that no fragment or extraneous ſubſtance remain in the wound, and keeping the whole hoof moiſt and ſoft with emollient poultices around it; and, in caſes attended with violent pain, recourſe muſt be had to ſuch internal remedies as are proper in inflammatory caſes, ſuch as the following mixture by way of a drink, in order to prevent, as much as poſſible, an inflammation, or a flux of humours to the afflicted limb, bleeding being firſt premiſed, together with uſing a low ſoft diet.

TAKE ſalt of nitre, two ounces; common treacle, two ounces. Diſſolve in a quart of water.

It will be neceſſary to repeat this draught morning and evening; if the horſe ſhould ſhow any uneaſineſs, or appear griped, the quantity of water may be increaſed or the ſame quantity of nitre may be given the horſe in a maſh of bran twice a-day, if it does not cauſe him loath his food. If the coffin-bone ſhould be wounded and turns carious, it will be tedious to wait for an exfoliation, as, from the ſpongy texture of this bone, it exfoliates but ſlowly: therefore, if it can conveniently be done, the carious parts may be ſcraped off with a knife, and afterwards dreſſed with pledgets of tow dipped in the tincture of myrrh; and let the poultice be applied above it.

In punctures, as above deſcribed, it is a common practice to pour into the wound hot corroſive oils (ſome even run into the wound an iron nail made red hot), in order, as the phraſe is to deaden the parts. In ſuperficial or ſlight wounds, when perhaps little more than the hoof is wounded, the application of hot oils can hardly be very hurtful: but the barbarous method of puſhing a hot nail into a recent wound, cannot fail of being attended with bad conſequences, as the cure is unqueſtionably worſe than the diſeaſe. But, at all events, when the puncture is deep, either of theſe cruel methods is extremely hurtful. The wound is ſaid to be of the moſt inveterate or deſperate kind; when, in fact, the bad practice of injudicious applications, &c. eſcape the juſt cenſure they deſerve.

5. *Contuſions* or *bruiſes* happen frequently on the coronet or top of the hoof, from the treading of other horſes feet, which will occaſion lameneſs; although, at the ſame time no external mark of violence will appear on the coronet farther than a little ſwelling, or the horſe will ſhow a ſenſe of pain when the affected part is touched or preſſed upon. The following poultice in this caſe may be applied with ſucceſs, if continued for ſome time.

TAKE thick lees of wine or vinegar, one pint; crude ſal ammoniac, two ounces; oat-meal or bran, ſufficient to make it of a due conſiſtence. Diſſolve the ſal ammoniac in the lees firſt.

Before concluding this ſection, it may not be improper to mention the following rules, which ought carefully to be attended to by every practitioner. 1. The firſt thing to be obſerved in dreſſing of wounds is, to remove all foreign bodies (if it can be done with ſafety), all lacerated or torn parts, whether of the fleſh or of the hoof, &c. which, from their being left in the wound, would greatly impede the cure. 2. All wounds ſhould be carefully inſpected at every dreſſing, obſerving attentively whether any alteration has been made on their ſurface, whether they be clean at the bottom, and free from any extraneous ſubſtance that may hinder or retard the cure. 3. Whatever appears mortified, or any fungous or proud fleſh, muſt be removed, either by ſuppuration, by the knife, or by cauſtic. 4. Cramming wounds with hard tents, or ſyringing them frequently with ſpirituous tinctures, are extremely hurtful. The former increaſes the pain and inflammation, &c. the latter produces a callus upon the internal ſurface of the wounds, which prevents their healing. 5. The dreſſings of wounds ſhould lie ſmooth and eaſy upon the parts. 6. Over-tight ligatures or bandages ſhould be carefully avoided. 7. As wounds in the feet or legs, for obvious reaſons, are more difficult to heal than on any other part of the body; therefore, reſt and a wide ſtall are abſolutely neceſſary, together with a low regimen or ſoft diet, in order to keep the body cool and open.

SECT. XLI. *Of that Diſeaſe in the Feet commonly called* FOUNDERED.

THE term *foundered* is frequently applied to lame horſes in a very vague manner, and without any determined or fixed meaning: for, when a horſe ſhows any defect or impediment in moving his fore-feet, he is then pronounced to be foundered, whether he really has been ſo or not; that is, according to what is commonly underſtood by that term, owing to the want or neglect of not making proper diſtinctions of the different diſeaſes in the feet. If we conſult authors who have treated upon this ſubject, we ſhall find their accounts of it very dark and imperfect; they bewilder the reader, and convey but a very indiſtinct idea of the nature of the diſeaſe: hence many errors are committed in practice, to the deſtruction of a number of valuable horſes, which otherwiſe, by proper management, might have been rendered ſound and uſeful. When a horſe is firſt attacked with this diſorder, he ſhows a great reſtleſſneſs, is hot and feveriſh, heaves much at the flanks, breathes quick, has a quick ſtrong pulſe, and groans much when moved about; at the ſame time, he ſhows ſymptoms of the moſt violent pain, ſometimes in one, but more frequently in both fore-feet; for which reaſon, he lies down much; but, when forced to move forwards, he draws himſelf together, as it were into a heap, by bringing forward his hind-feet almoſt under his ſhoulders, in order to keep the weight of his body as much as poſſible from reſting upon his fore-feet. In ſtepping forward, he ſets his heel down firſt with great caution, as afraid of touching the ground. This laſt ſymptom ſhould be particularly attended to, as from it we may conclude with certainty that the chief ſeat of the diſorder is in the feet. The hoofs at the ſame time are exceedingly hot; and, if water is thrown upon them, they dry inſtantly: if an attempt is made to pull off any of the ſhoes, the horſe ſhoes great uneaſineſs upon the leaſt twiſt or preſſure made upon any part of the foot, and a great unwillingneſs to ſupport the weight of his body upon the other foot, eſpecially when they are both alike affected.

It is univerſally allowed, that the cauſe of this diſeaſe proceeds from too violent exerciſe, ſuch as riding very hard upon ſtony grounds or turnpike roads, and that young horſes are moſt liable to it; and to theſe we may likewiſe add, unequal preſſure upon the internal parts of the foot, from the concave or hollow form of the common ſhoes. All theſe cauſes combined together, when a horſe is of a plethoric or full habit of body, and not accuſtomed to violent exerciſe, occaſion this diſeaſe in a greater or leſs degree. To form ſome faint idea of this malady in horſes, we may in a great meaſure appeal to what we experience ourſelves in running upon hard ground; for we find, that it occaſions a great heat, attended with a ſmart pain in our feet, which would be greatly increaſed from uneaſy ſhoes, eſpecially if compelled (like horſes) to continue the running for any conſiderable time. The feet likewiſe become turgid and painful after a long day's journey, eſpecially if the perſon is not accuſtomed to travel; and this inflammation frequently terminates in bliſters upon the ſoles of the feet. Hence it is evident, that, in proportion to the habit of body the horſe is in at the time, and the violence of the labour or exerciſe he has undergone, the inflammation in the internal parts of the foot will be more or leſs violent, and attended with all the ſymptoms already mentioned.

This diſeaſe, then, appears from the ſymptoms attending it, and the effects it afterwards produces in the feet, to be, in its firſt ſtage, an inflammation of the internal parts of the feet, ariſing from the violent exerciſe, which occaſions a more than ordinary determination of the blood to the feet: hence that rapid circulation of the blood in the veſſels within the hoof, which frequently terminates in a rupture of theſe veſſels, and of courſe an extravaſation of the blood, and, in ſome caſes, a total ſeparation of the horny ſubſtance of the hoof from the aponeurotic fibres upon the fore-part of the coffin-bone; whilſt in others, where it has been leſs violent, a concretion or growing together of the parts within the hoof has taken place, ſo as to appear upon diſſection one ſolid maſs; and hence lameneſs.

Thus, a young chaiſe-horſe, after a hard day's work, was attacked with all the ſymptoms already mentioned, and was treated in the common manner as above related, that is, rowelled, &c. In a few weeks after the diſeaſe had taken its courſe in the ordinary way, he was put under the author's care. The ſole, a little before the point of the frog, in one of his fore-feet, became ſoft; and having a curioſity to ſee the cauſe of it, the author cut away the ſole, which was but thin, and found a cavity containing a reddiſh coloured liquor: after removing the ragged parts of the hoof, a large tranſverſe opening ſhowed itſelf, into which a probe was introduced upwards between the coffin-bone and the hoof; the connection between the tendinous fibres upon the ſurface of the coffin-bone and the hoof was deſtroyed at the fore-part or toe; the bone, loſing part of its ſupport, preſſed down upon the horny ſole, and produced that ſwelling or convexity of its ſurface, which is called a *high, round*, or *pumice ſole*. The hoof loſt its former ſhape, growing narrow towards the toe, with a preternatural thickneſs of the horny ſubſtance of the cruſt, whilſt the quarters or ſides of the hoof were decayed, thin, and full of deep wrinkles, together with a hollowneſs upon the ſurface of the upper part of the hoof, the whole foot having a diſeaſed appearance. When the horſe had recovered ſo far as to be able to walk, in going forward he threw out his legs well before him, but drew them backwards before he ſet his foot to the ground; ſetting the heel down firſt with great caution, upon which he reſted moſt, the toe being turned a little upwards. From this ſymptom only, we may judge with certainty, even though at a diſtance, upon ſeeing a horſe walk, whether he has ever been foundered or not.

This diſeaſe proves ſtill more violent, and indeed ſometimes fatal, if the horſe has been allowed to ſtand in cold water when his feet are overheated. Thus, a ſaddle-horſe, after being rode very hard, was turned looſe into a ſtable-yard all over in a ſweat; he went immediately into the water-pond, where he was ſuffered to ſtand for a conſiderable time in very cold weather: a few hours afterwards he was ſeized with a moſt violent fever, and a great pain in his fore-feet: he lay upon the litter for ſome days in the greateſt agony; and at laſt both his hoofs dropt off, occaſioned by a mortification brought upon the parts from the application of the cold water, which rendered him entirely uſeleſs.

From what has been ſaid with reſpect to this diſeaſe, it is evident, that as the circulation is greatly increaſed, and the current of blood chiefly determined towards the fore-feet, attended with ſymptoms of the moſt violent pain, we may thence conclude, that there is an inflammation in theſe parts: therefore the cure muſt firſt be attempted by diminiſhing the circulation of the blood, giving cooling ſalts internally, glyſters, an opening diet, and plenty of diluting liquor four or five times a-day, together with emollient poultices applied warm all round the hoofs, in order to ſoften them, and keep up a free and equal perſpiration; obſerving, that his ſhoes be eaſy upon his feet; but by no means to pare the ſole or frog to that exceſs which is commonly done in caſes of this kind, farther than cleaning away the hardened ſurface of the ſole and frog, in order that the poultice may have the deſired effect, by increaſing the perſpiration through the pores; and to avoid all manner of greaſy or oily applications to the hoofs, for the reaſons already mentioned.

In all violent inflammations, there is nothing which contributes more to give immediate relief, than plentiful bleeding timeouſly performed; and which ought by no means to be neglected, or too long delayed: for, in caſes of this nature, although the fever may be ſo far overcome by ſtrength of conſtitution, or prevented by medicines from deſtroying the life of the animal; yet the effects of it will ever afterwards remain, and, of courſe, the horſe will be lame for life. But, in order to judge properly when this operation may be neceſſary, the pulſe muſt be attended to, the knowledge of which is of the utmoſt importance in the practice of farriery, and ſhould be more generally ſtudied, as it is the only criterion or rule by which we may be directed when bleeding is neceſſary, or when it ought to be avoided. But when this operation is neglected, and the cure is firſt attempted by rowels, &c. it is a long time before they can come to a proper ſuppuration, on account of the violence of the fever. Hence, in place of ſuppurating, they ſometimes turn into a gangrene, by which many horſes loſe their lives. But, at all events, before the rowels could have any effect, even allowing they were to ſuppurate in the common time (which is about three days), the inflammation within the hoof will by that time have taken place, and its conſequences will follow, to the ruin of the feet, and, of courſe, the loſs of the horſe.

The manner in which a horſe walks or ſtands upon his fore parts, when affected with this diſorder, has induced many practitioners, &c. to conclude, that the ſhoulders are affected: hence they ſay a horſe is foundered in the body; and that drains, ſuch as rowels, are the only proper remedies. But granting there was a ſtiffneſs, &c. all over the body, which is frequently the caſe in the beginning of inflammatory fevers, bleeding ought to be premiſed, as the firſt neceſſary ſtep towards the cure.

Sect. XLII. *Hoof-Bound.*

This complaint affects the hoofs differently, according to their natural ſhape, and the treatment they are expoſed to, whether from injudicious ſhoeing, keeping the hoofs too hot and dry, or paring the ſole and binders at every time they are ſhoed. Some are affected with a circular contraction of the cruſt, compreſſing the whole foot. In others, the cruſt is contracted at the coronet only, compreſſing the annular ligament, &c. A third kind is, when either one or both heels are contracted: hence, therefore, in proportion to the degree of contraction, the internal parts of the foot are compreſſed, and the horſe becomes more or leſs lame.

It has been already obſerved, Sect. xxxix. that deep-cruſted narrow hoofs, or what are commonly called *aſſes hoofs*, are naturally diſpoſed to this malady: when they become diſeaſed, they are eaſily known from their appearance, as they are ſmaller in proportion than the legs, and frequently ſmaller at their baſis than at the coronet; the cruſt of the heels is high, thick, and ſtrong; the frog waſted and rotten; the hoofs are almoſt perpendicular; the horſe moves in pain, ſteps ſhort and quick, and trips and ſtumbles frequently; it is not uncommon that one foot only is affected, which then appears conſiderably ſmaller than the other.

This diſeaſe is haſtened and brought on by paring and hollowing out the ſole and binders at every time the ſhoes are renewed, from a miſtaken notion of widening the heels; hence they are thereby made ſo very thin, that the cruſt at the extremity of the heels may be forced almoſt cloſe to one another even with one's fingers: and what greatly forwards the complaint, is the form of the ſhoes commonly uſed, which are made hollow; for this practice of hollowing the ſhoes ſo univerſally prevails, that, without any regard to the ſhape of the ſole, whether it be flat or otherwiſe, the ſhoe is made concave or hollow upon that ſide which is placed next the foot. Hence the outer edges of the concave ſhoes force the cruſts at the heels nearer to one another: which being there retained, the contraction of the hoof becomes general, and confirmed beyond the power of art or remedy.

In the ſecond ſpecies of this complaint, the hoof acquires a particular ſhape, which Mr Gibſon, in his Farriery, compares to that of a bell; that is, the hoof appears contracted and tight round the coronet and inſtep, but ſpreads wider downwards to its baſis; the hoof in other reſpects looks well and ſound. This is generally occaſioned by keeping the horſe ſtanding for a long time together in the ſtable upon hot dry litter, without moiſtening and cooling the hoofs; allowing them at the ſame time to grow to a preternatural ſize both in length and breadth: hence, from the great ſtrength, the rigidneſs and dryneſs of the under part of the hoof, a preternatural ſtricture or preſſure is made by the hardened cruſt at the coronet, which compreſſes the annular ligament and parts near it.

The third ſpecies of this malady is, when either one or both heels are contracted. This frequently happens even in all kinds of hoofs, but more eſpecially in thoſe that are flat, from the uſe of concave or hollow ſhoes, together with cutting out the ſole and binders at every time the horſe is ſhoed. But it more frequently happens, that the inſide heel only is contracted, from the natural weakneſs of that part of the hoof: hence the weight of the limb, &c. preſſing upon the inſide cruſt at the heel, it is inflected or bended inwards; by which, together with concave form of the ſhoe, and loſs of ſubſtance from paring, &c. the diſorder is increaſed, the cruſt of the heels becomes contracted, and compreſſes that quarter of the foot, and of courſe occaſions lameneſs.

With reſpect to any particular method of cure to be obſerved in removing this diſeaſe, all that can be ſaid is, That, it is one of that kind which comes on gradually and perceptibly, it may by proper care and management, when properly attended to, be prevented. But when once it becomes confirmed, it never will admit of a thorough cure. Nevertheleſs, it may be ſo far palliated as to render a horſe in ſome degree ſounder, by keeping the hoofs cool and moiſt; as, in this caſe, they are naturally diſpoſed to be very hot, dry, and hard, his ſhoes ſhould be flat, narrow, and open heeled, the hoofs never greaſed nor oiled, the ſoles never pared. But as the cruſts of the heels in theſe hoofs are preternaturally high and ſtrong, they ſhould always be pared down till they are lower than the frog, that it if poſſible, may reſt upon the ground. This operation will tend to remove that ſtricture from the heels and frog, which will greatly relieve them. But many people, adhering too ſtrictly to that general rule, which from inattention has creeped into practice, *viz.* of paring down the toes, and keeping the heels entire, without reflecting upon the ſhape or natural formation of the particular hoofs, continue the ſame practice upon deep-cruſted, high-heeled hoofs, which is only neceſſary to be obſerved in long-toed hoofs with low heels, and thereby this diſorder is greatly increaſed; the weight of the body is likewiſe thrown forwards, by which the horſe ſtands too much upon his toes; and hence the leg-bones, from the aukward habit of the horſe's ſtanding, become bent at the joints, and occaſion what is called *knuckeling* or *nuckeling*.

The ſecond ſpecies of this complaint, is when the cruſt at the coronet becomes contracted; and compreſſing the annular ligament, &c. occaſions lameneſs, the hoof acquiring that ſhape formerly compared to that of a bell. Different methods have been tried and recommended for the cure. Mr Gibſon propoſes to make ſeveral lines or raſes on the fore-part of the hoof with a drawing knife, almoſt to the quick, from the coronet down

Hoof-bound.

down to its baſis, and turning the horſe out to graſs,: others after this operation is performed, ſcrew the heels wide by means of a ſcrewed ſhoe: a third method practiſed is, to draw the ſole, and divide the fleſhy ſubſtance of the frog with a knife, and keeping it ſeparated by the ſcrewed ſhoe abovementioned: a fourth method in uſe, is to make the inner-rim of the ſhoe-heel very thick on the under ſide (its upper ſurface being quite flat); and by making it reſt upon the binders and ſole at the extremity of the heels, by preſſure from the weight of the body, the heels are forced to recede to a greater diſtance from one another. Either of theſe methods may indeed in a ſmall degree widen or expand the horney ſubſtance of the cruſt, and may be of uſe in recent contractions. But when once it has become confirmed, and is of ſome ſtanding, no means whatever can then reſtore the internal parts to their primitive ſtate; for as the contraction takes place, the tender parts within the hoof being compreſſed, loſe their tone, and diminiſh in their ſize. The blood-veſſels become impervious; hence a decay or waſting of the whole foot, and not unfrequently a concretion of the parts, and of courſe the impoſſibility of the horſe ever becoming ſound. But as it has been obſerved, that the cauſe of this ſpecies of the complaint now under conſideration proceeds from allowing the hoofs to grow to an extraordinary ſize, and keeping them too hot and dry, by which they acquire a rigidity and dryneſs, occaſioning a preternatural compreſſion upon the coronet; to remove which (as the caſe will only admit of palliation), the ſurface of the hoof at its baſis muſt be pared down till the blood appears, the thick ſtrong cruſt upon the outſide towards the toe raſped in the ſame manner, and the horſe turned out to graſs in ſoft meadow-ground till the feet recover. But it muſt be obſerved, that if both hoofs are alike affected, one of them at one time only ſhould be treated in the manner directed, as a tenderneſs will remain for ſome days, which might prevent the horſe from walking about in ſearch of food.

The third ſpecies is a contraction of one, or ſometimes of both heels, in flat feet, from the uſe of concave ſhoes, &c. Where it has not been of a very long ſtanding, it may, by proper management, be greatly relieved, by laying aſide the uſe of concave ſhoes, and refaining from paring the ſole, &c. But to remove the ſtricture of the hoof more immediately, the whole contracted quarter of the cruſt near the heel muſt be raſped or pared to the quick, from the coronet to its baſis, cloſe to the frog, taking care to avoid drawing blood, putting on a barred ſhoe, cauſing the ſhoe-bar to preſs upon the frog, keeping the hoof cool and moiſt, or turning the horſe out to graſs. Hence the preſſure from the contracted hoof being removed, and the frog at the ſame time reſting upon the bar of the ſhoe, the contracted quarter is thereby dilated or expanded: the new hoof growing from the coronet downwards, acquires a round, full ſhape, and becomes of its original form.

From what has been ſaid concerning this diſorder in the feet of horſes, it is evident, what little proſpect there is of effecting a thorough cure by art, as the complaint is of ſuch a nature as only to admit of ſome palliation, and even then in ſome very favourable caſes only. Nevertheleſs, it is practicable to prevent contractions in the hoofs from taking place, even in thoſe hoofs which are ſeemingly diſpoſed that way from their ſhape, &c. by obſerving the rules already laid down, viz. by keeping the hoofs moiſt and cool, which is their natural ſtate: uſing flat ſhoes, from which the hoofs can acquire no bad ſhape; allowing the ſole and frog to continue in their full ſtrength the latter eſpecially to reſt upon the ground; and keeping the cruſt within due bounds, not ſuffering it to grow too long towards the toe, nor too high at the heels.

Corns.

SECT. XLIII. *Of Corns.*

In the human body, corns in the feet are termed ſo with ſome propriety, from their horny ſubſtance; but what are called *corns* in the feet of horſes, are very improperly named, as they are quite of an oppoſite nature, rather reſembling contuſions or bruiſes and not unlike thoſe bruiſes which happen in the palms of the hands and fingers to working people ariſing from violent pinching, bruiſing, &c. where the ſkin is thick, which appears of a blackiſh red colour, and exceedingly painful at firſt containing blood; but in the end, the ſerum or thinner parts being abſorbed, the red particles appear when the dead ſkin is removed, like red powder. In like manner corns, or rather bruiſes, appear red and *foxy*, as the phraſe is. They are ſituated in the corner or ſharp angle of the ſole at the extremity of the heels, where the cruſt reflects inward and forward, forming the binders. But they are more frequently to be met with in the inſide heel, from the manner of the horſe's ſtanding, together with the preſſure or weight of the body, which is greater upon the inſide of the hoof than the outſide. Bruiſes of this kind are exceedingly painful, inſomuch that the horſe ſhrinks and ſtumbles when any thing touches or preſſes upon that quarter of the hoof; hence lameneſs.

This complaint ariſes from different cauſes, according to the ſhape or natural formation of the hoof, together with the treatment they are expoſed to. But the following are the moſt frequent.

1*ſt*, In flat low heels, from too great a preſſure of the ſhoe-heel upon the ſole, whether from caukers, a too great thickneſs of iron upon the heels of the ſhoe, or its being bended downwards upon the ſole, or the ſhoe made too concave; either of theſe cauſes will produce the ſame effect; for, from the too great preſſure upon the horny ſole, the fleſhy ſole, which lies immediately underneath it, is compreſſed and bruiſed between the ſhoe-heel, the ſole, and the extremities or outward points of the coffin-bone; and hence a contuſion or bruiſe, attended with an extravaſation of the blood, which afterwards gives that part of the ſole a red appearance, and is the reaſon why the ſole on that place never grows up ſo firm and ſolid as it was before, but remains ſoft and ſpongy, forming a lodgement for ſand and gravel, which frequently inſinuates itſelf into the quick, cauſing an inflammation, attended with a ſuppuration or diſcharge of matter, which, if not finding a paſſage below, will break out at the coronet.

2*d*, This complaint is produced in wide open heels, when the hoofs are very thick and ſtrong, from too great a luxuriancy of the binder, which being inflected or bended downwards between the ſhoe and the

Corns.

ſole, compreſſes the fleſhy ſole, as already mentioned; and hence lameneſs.

3*d*, This malady, in deep narrow hoofs, proceeds from a contraction of the cruſt compreſſing the heels, &c. Hence, it not unfrequently happens in hoofs of this ſhape, that both heels are alike affected from the ſtricture and preſſure of the hardened cruſt upon the tendinous aponeuroſis, &c. on the outſide of the coffin-bone, which in this caſe is bruiſed between the bone and the cruſt: hence the redneſs may ſometimes be traced upwards almoſt to the coronet. In this caſe no radical cure can be take place, as the cauſe which produces theſe bruiſes, &c. will exiſt while the horſe lives, and at the ſame time the horſe will be lame from the contraction of the hoof; but the remedy propoſed in the preceding ſection, by way of palliation for hoof-bound feet, may be of uſe to render the horſe in ſome meaſure more ſerviceable.

With reſpect to the two firſt cauſes, when the bruiſe proceeds from too great a preſſure from the ſhoe-heels, &c. upon the ſole, the ſhoe muſt be made ſo as to bear off the tender part, and likewiſe to ſome diſtance on both ſides of it; for which purpoſe, a round or a barred ſhoe will be neceſſary. The red and bruiſed parts muſt be cut out to the quick, and the hoof kept ſoft with emollient poultices for ſome time. But the texture of the blood-veſſels, and likewiſe that of the hoof at the bruiſed part, being deſtroyed, a ſpongineſs remains afterwards, and upon the leaſt unequal preſſure from the ſhoe, &c. are liable to a relapſe, never admitting of a thorough cure, and of conſequence ſubject to frequent lameneſs.

Corns or bruiſes in the feet of horſes might, by taking proper care of them, be eaſily avoided: for in thoſe countries where horſes go moſtly barefooted, this malady is not ſo much as known; neither are thoſe horſes that go conſtantly at cart and plough ſubject to them: hence, therefore, this complaint is moſt frequently to be met with in great towns, where horſes go much upon hard cauſeway, having their ſhoes turned up with high caukers on the heels, and frequently renewed, at the ſame time their hoofs being kept too dry and hard, from ſtanding too much upon hot dry litter; hence will appear the neceſſity of complying with what is moſt natural to the hoofs of horſes, namely, coolneſs and moiſture, together with uſing ſuch a form of ſhoe as will preſs equally upon the circumference of the cruſt, and without giving it any bad unnatural ſhape. See ſect. xlvii.

SECT. XLIV. *Of Running Thruſhes.*

1. A RUNNING THRUSH (or FRUSH), is a diſcharge of a fetid, and ſometimes ichorous, matter, from the cleft in the middle of the frog, affecting one, frequently both, and in ſome caſes all the four feet. But, generally, the fore-feet are moſt ſubject to this diſeaſe. In moſt caſes, it ſeldom admits of a radical cure; but is ſubject to frequent relapſes, occaſioning lameneſs, from the rawneſs and tenderneſs of the parts affected, on being expoſed to ſand, gravel, &c. or in rough ground, from the heels treading on ſharp ſtones, &c. and when the horſe happens to be of a bad habit of body, they even degenerate into what is commonly called a *canker*.

Runnnig Thruſhes.

Running thruſhes, according to Mr Gibſon, "are ſometimes profitable to horſes of fleſhy and foul conſtitutions; becauſe (ſays he) they drain off a great many bad humours." But however ſalutary or beneficial they may be in ſome particular conſtitutions, yet, upon the whole, they prove extremely troubleſome, on account of the lameneſs and tenderneſs of the feet affected with them; and, where there occurs one caſe in which they may properly be ſaid to become beneficial to the conſtitution, there are a far greater number in which they are hurtful, as they are brought on by the treatment the hoofs are expoſed to, together with the injudicious method generally obſerved in ſhoeing them, particularly in thoſe hoofs that are narrow-heeled, or diſpoſed to be hoof-bound, running thruſhes being always an attendant upon that complaint. But, to explain this more particularly, there is, in the middle of the frog, a cleft or opening, by which the heels in a natural ſtate have a ſmall degree of contraction and expanſion, eſpecially when the horſe treads or preſſes his heel upon the ground, the frog then expands; when, therefore, a horſe is ſhoed with concave or hollow ſhoes, the heels are deprived of that power of expanſion, being conſtantly confined in a contracted ſtate by the reſiſtance from the outer edges of the concave ſhoe, by which the frog is preſſed or ſqueezed on both ſides, by the cruſt of the heels being brought nearer to or almoſt into contact with one another. Hence pain, inflammation, an obſtruction of the blood, &c. (in the fleſhy ſubſtance of the frog), and of courſe that waſting and rottenneſs of its external covering, which, falling off in pieces, leaves the quick almoſt bare; the new frog, growing in detached pieces, never acquires the ſolidity of the former; and hence that rawneſs and tenderneſs which ever afterwards remain, and that extreme ſenſibility of pain when any hard ſubſtance touches that part of the foot, and of courſe ſubject the horſe to frequent lameneſs. There are no doubt, other cauſes which may be ſaid to occaſion this malady, even in thoſe hoofs that are wide and open at the heels, where there is not the leaſt appearance of a contraction at the heels: but theſe are generally owing to the treatment the hoofs are expoſed to in the ſtable, by keeping them too hot and dry for a long tract of time together, during which the natural perſpiration is greatly obſtructed, by the conſtant application of greaſe or oil to the hardened hoofs, and ſtuffing them up with hot, reſinous and greaſy mixtures, as tar, turpentine, &c. the horſe being all the while kept at full feeding, and not having proper and neceſſary exerciſe to promote the circulation of the fluids, and to forward the ordinary ſecretions, &c.: the legs ſwell and inflame; at laſt a running in the frog appears; and hence this diſcharge is ſaid to be beneficial to the conſtitution, when in fact it is but too frequently brought on by a ſlothful neglect, and kept up by bad management. Freſh air and regular exerciſe are eſſentially neceſſary towards preſerving horſes in an active healthy ſtate; for running thruſhes, like other diſeaſes to which pampered horſes are ſubject, are not known in thoſe countries where horſes run at large in the fields; neither are they ſo frequently to be met with in the country amongſt labouring horſes, whoſe exerciſe is regular, and whoſe hoofs are much expoſed to coolneſs and moiſture, the natural ſtate of the feet of horſes.

With reſpect to the cure of running thruſhes, it has been

Running Thruſhes.

been hinted, that in moſt caſes, eſpecially where it has been of long ſtanding, affecting all the frogs more or leſs, it is impracticable to eradicate it by any aſſiſtance from art. For inſtance, when it proceeds from contracted narrow heels in thoſe feet which are ſaid to be hoof-bound, it is then an attendant only on that diſeaſe; and therefore cannot be cured without removing the firſt cauſe, though then it will only admit of ſome ſmall degree of palliation*. But in thoſe hoofs which are wide and open at the heels, where the complaint is recent, one or both the fore-feet only being affected, and where there is reaſon to ſuſpect that it proceeds from the uſe of concave or hollow ſhoes, or keeping the hoofs too hot, dry, and hard, the cure then may be completed with eaſe and ſafety by laying aſide the uſe of concave ſhoes, waſhing the frogs clean after exerciſe, and dreſſing them with Mel Egyptiacum, made as follows.

> *Mel Egyptiacum.* Verdegris in fine powder, two ounces; honey ſix ounces; vinegar four ounces; boil them over a gentle fire till they have acquired a reddiſh colour.

Or a ſolution of blue vitriol.

> *Solution of vitriol.* Blue vitriol powdered, one ounce; water, one quart:

keeping the hoofs cool and moiſt. But, at the ſame time, recourſe muſt be had to internal remedies by way of revulſion, as purging or diuretic medicines, bleeding being firſt premiſed: if the former is made choice of, twice or thrice will be ſufficient, repeated at proper intervals; but if the latter, which ſeems preferable, they may be continued for ſome time with great ſafety, without loſing one day's work of the horſe.

In ſome caſes, there is frequently not only a diſcharge of fetid matter from the clefts of the frogs; but, at the ſame time, a diſcharge of greaſy-like matter from the round protuberances of the heels, and the hollow of the paſtern joints. It will be neceſſary, therefore, to make a diſtinction between the matter diſcharged in this caſe, which appears of a thick, white, clammy, or ſoapy conſiſtence, and that running in the legs commonly termed a *greaſe*, which is of a quite oppoſite quality; the latter by good management will admit of a thorough cure, whilſt the former baffles all the power of medicine.

2. In horſes of a groſs habit of body, eſpecially the heavy draught-kind, running thruſhes ſometimes degenerate into what is commonly called a *canker*. In this caſe, the horny ſubſtance of the frog is ſoon thrown off; the fleſhy parts grow to an immoderate ſize, the luxuriant ſubſtance or ſpongy fleſh having a great number of papillæ or tubercles, which Mr Gibſon compares not improperly to cauliflower, the colour only excepted, which is of a pale red, and ſometimes variegated and tinged with blood; attended with a copious diſcharge of a thin ichorous fetid humour, having a moſt offenſive ſmell. If its progreſs be not ſpeedily ſtopt, the fleſhy ſole, from its vicinity, becomes likewiſe affected; the horny ſole rots, decays, and falls off: the whole foot turns into a kind of quag or bog (in warm weather full of maggots, which it is almoſt impoſſible to prevent, even with the moſt corroſive dreſſings); the tendons become likewiſe affected, the bones carious, the hoof falls off, and the horſe is rendered uſeleſs. To prevent theſe and the like conſequences, as ſoon as a running thruſh begins to ſhow the leaſt malignant diſpoſition, proper means muſt be uſed to correct the habit of body, and to divert this diſcharge to ſome other outlet, either by purging or diuretic remedies, continued for ſome time, bleeding being firſt premiſed. As to external applications, the firſt thing neceſſary to be done, is to pare down the cruſt till it is lower than the fungus, or growth of the canker, and to remove any hard pieces of the hoof or ſole wherever it preſſes upon the tender parts; the circular part of the cruſt ſhould be ſurrounded and kept ſoft with an emollient poultice. For dreſſings, the mildeſt eſcharotic powders may be firſt tried, as the following:

> Take burnt alum powdered two ounces; blue vitriol powdered one ounce.

But when it degenerates into the laſt ſpecies mentioned above, affecting the fleſhy ſole, &c. the ſtrongeſt corroſive applications will then be neceſſary, and ſometimes hardly ſufficient to keep down the luxuriancy of the fungus. The cauſtic oils are found preferable, as ol. vitriol. aquafortis, butter of antimony: either of theſe may be applied once every day; otherwiſe, if neglected dreſſing too long, or to every other day, which is the common practice, the great humidity and moiſture iſſuing from the fungus ſo weakens the force of the ſtrongeſt oils, that they have little or no effect: when theſe ſharp dreſſings ſeem to gain upon the canker, it may be dreſſed with equal parts of red precipitate and burnt alum pounded and mixed together, till ſuch time as the new ſole begins to grow; the purging or diuretic medicines being given at proper intervals till the cure is completed.

Falſe-quarter and Sand-crack.

Sect. XLV. *Of Falſe-quarter, and Sand-cracks.*

1. What is commonly called *falſe-quarter* in the foot of an horſe, is a cleft or chink in the ſide or quarter of the hoof, running in a ſlanting direction with the horny fibres of the hoof, from the coronet to its baſis, by which the horny ſubſtance of the cruſt is divided; one part of the hoof being in a manner detached from the other, and rendered unable to ſuſtain its portion or ſhare of the weight of the limb, &c. and hence the name of *falſe-quarter*: for, when the horſe ſets his foot on the ground, the chink widens; but, when it is lifted up, the hardened edges of the divided hoof take in between them the tender and ſoft parts, and ſqueeze them ſo as to occaſion frequent bleeding at the chink, and is frequently attended with inflammation, a diſcharge of matter, and of courſe lameneſs.

This complaint, notwithſtanding the different accounts commonly given as to the cauſe of it, is in fact the effect of a deep wound or bruiſe upon the coronet, by which the continuity of the parts has been entirely broke off; for we always find, that when the horny fibres are divided at their roots, they never unite or grow up as before, but leave a blemiſh, more or leſs, in proportion to the ſize and deepneſs of ſuch wounds, &c. We have many inſtances of this, even in the human body; for when a wound happens at the roots of the nails, whether in the fingers or toes, it occaſions a blemiſh, which continues to grow in the ſame manner afterwards. Hence it will be evident, that no radical cure can poſſibly take place; but we may ſo far palliate the complaint as to render the horſe ſomething uſeful, by uſing a ſhoe of ſuch a conſtruction

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* See Sect. xlii.

Falſe-quarter and Sand-cracks

tion as will ſupport the weight of the limb, &c. without reſting or preſſing too much upon the weakened quarter; for which purpoſe, a round, or what is called a *barred ſhoe*, will be moſt proper. The ſurface of the hoof, on and near the diſeaſed part may be cut down lower than the ſurface of the cruſt upon which the ſhoe is to reſt; or, if the hoof will not admit of being cut down, the ſhoe may be raiſed up from the weak quarter. Either of theſe means will remove the weight of the body from the diſeaſed part, and the horſe will go ſounder.

But as ſand and gravel is eaſily admitted into the chink or crack, where, being accumulated and pent up, it irritates and inflames the parts, whereby matter is formed underneath the hoof, which cauſes lameneſs, and which not unfrequently breaks out at the coronet, producing the moſt inveterate ulcers, which become extremely difficult to heal, on account of the ſinus or fiſtula branching out in different directions underneath the hoof: therefore, horſes with this defect ſhould be carefully obſerved; and, when the thick hardened edges of the chink or crack grow too high, by which it is ſo much the deeper, and, of courſe, lodges the greater quantity of ſand, &c. theſe edges ſhould be raſped or pared with a crooked knife, till the ſeam diſappears. But wherever there remains a blackneſs, or appearance of gravel, that part muſt be tracked farther; always obſerving, if poſſible, to avoid drawing of blood. The chink or crack thus made ſmooth and equal, no ſand or gravel can lodge in it; and as the parts will be tender, it will be neceſſary to apply an emollient poultice for ſome days, till the tenderneſs wear off. If the inflammation has been great, and matter formed in the crack, or the parts wounded by the knife in cutting its hardened edges, proud fleſh may riſe and jet out. In this caſe, the hard parts of the hoof near it are to be removed, a digeſtive poultice applied; and when the inflammation is abated, the proud fleſh may be touched with the following corroſive powder:

TAKE blue vitriol burnt, two drams; corroſive ſublimate, one dram; rubbed into powder.

2. A *ſand-crack* is of much the ſame nature with a falſe-quarter; only they run more frequently in an horizontal direction than the latter, on the outſide or ſurface of the cruſt: they are generally the effect of ſlight or ſuperficial wounds upon the coronet, and grow gradually downwards towards the baſis of the hoof, and at laſt are cut or raſped off in the ſhoeing; when they occaſion lameneſs from lodging ſand or gravel, they muſt be treated in the ſame manner as already mentioned for *Falſe-quarters*.

SECT. XLVI. *Of Horſes cutting their Legs in Travelling.*

HORSES frequently cut their legs both before and behind, by ſtriking or knocking the hoof when trotting, &c. againſt the oppoſite leg, whereby a wound is made, which is attended with an inflammation, ſwelling, &c. and of courſe lameneſs. The parts commonly wounded from cutting in the fore-legs, are the prominent and back part of the fetlock joint; and under the knee joint on the inſide of the leg. The former is moſt common: the latter only happens to thoſe horſes who raiſe their feet high in trotting; and, as ſuch horſes generally go faſt, this laſt ſpecies of cutting is diſtinguiſhed by the name of the *ſwift* or *ſpeedy cut*.

Cutting.

In the hind legs, horſes cut themſelves upon the prominent part of the fetlock-joint; and ſometimes, eſpecially thoſe who move their legs too low, cut upon their coronet. But whether they cut before or behind, it commonly proceeds from ſome of the following cauſes.

1*ſt*, Injudicious ſhoeing; under which may be included, the hoofs being ſuffered to grow too large and broad, the ſhoe projecting over the inſide edge of the hoof, the clenches or rivets of the nails riſing above the ſurface of the cruſt.

There are a great variety of ſhoes recommended for preventing this complaint, of different conſtructions: but the moſt common are thoſe that are made thick upon the inſide heel. Others have a border or margin turned up upon the inſide of the ſhoe's rim, commonly called a *feather*, which raiſes the inſide of the hoof conſiderably higher from the ground than the outſide. Either of theſe ſhoes may be of uſe to a dealer, in order to make a wry-footed horſe appear to ſtand ſtraight upon his limbs; but can have no effect upon a horſe's manner of moving his legs, eſpecially at the time when the foot is raiſed from the ground, and paſſing by the other leg, ſo as to prevent him from cutting. The reaſon why this method of ſhoeing ſeems to ſucceed, eſpecially in the hind-feet, is this; when the ſhoe is made thick upon the inſide heel, which part commonly ſtrikes the oppoſite leg, the ſhoe-nails are removed to a conſiderable diſtance forward from the thick part of the ſhoe, which, at the ſame time, is kept much within the circle of the hoof; and, on that account, it becomes impoſſible that the ſhoe ſhould touch the oppoſite leg. But, to ſhow that this raiſing of the inſide quarter or heel, by a thickneſs of iron in the ſhoe, is not neceſſary to prevent horſes from cutting, the author has frequently cauſed the heel of the ſhoe to be made thinner than common; and, by keeping it within the hoof, it anſwered equally well with the former: he has likewiſe cauſed the ſhoe to be cut in the middle of the quarter, whereby the hoof at the heel was left quite bare; which anſwered the purpoſe ſo much the better, as the foot was the leſs loaded with the additional weight of ſuperfluous iron.

2*d*, The great weight of the concave ſhoes commonly uſed, is likewiſe another cauſe why horſes, that in other reſpects move well upon their legs, do frequently cut and wound themſelves; and to this we may add, the great length of the hoof at the toe, eſpecially in the fore-feet, which is allowed frequently to grow to an unnatural ſize. It has been already obſerved, that a great load of iron is by no means neceſſary in a horſe's ſhoe: on the contrary, it becomes a great diſadvantage; for a flat one that is properly conſtructed, and well wrought, that is, well hammered, will wear as long as a concave or hollow ſhoe that is almoſt double the weight of the former. This, at firſt view, will perhaps, appear a paradox; but, nevertheleſs, it is a fact: for as the round or outward ſurface of a concave ſhoe is the only part that touches the ground, and is liable to be worn, it ſoon grows thin, and yields to the preſſure from the weight of the body; and therefore muſt be renewed before the other parts of it are hardly touched, and but little reduced in its original weight. But the ſurface of a flat ſhoe, reſting equally upon the ground, will remain firm upon the hoof, and be ſufficiently ſtrong to ſupport the weight of the body till it wears very thin.

When horſes cut or wound themſelves immediately under the knee joint, this is called the *ſwift* or *ſpeedy cut*; and is occaſioned by raiſing the feet high in trotting, whereby the inſide toe or quarter of the hoof ſtrikes againſt the oppoſite leg. This is eaſily prevented by making the ſhoe ſtraight, and placing it conſiderably within the hoof at the part where the hoof ſtrikes the other leg, obſerving that no nails are to be put in that part of the ſhoe which is kept ſo much within the hoof, otherwiſe they muſt immediately plunge into the quick.

3d, When cutting proceeds from a natural defect, that is, a wrong poſition of the foot upon the leg-bones, whereby the toes are turned too much outward or too much inward; at the ſame time, if the horſe croſſes his legs much in trotting; in this caſe there is no preventing his cutting altogether, though it may be palliated. Such horſes are by no means fit for journey-riding, being generally addicted both to cutting and ſtumbling.

In the *laſt* place, it may proceed from fatigue or weakneſs. This happens frequently, even to thoſe horſes that deal their legs well (as the phraſe is), eſpecially in young horſes; but they ſoon leave it off when they acquire more ſtrength, and are accuſtomed to their work: moſt people muſt have experienced this in themſelves when boys, as they at that age are very ready to knock their ancles with the heel of the oppoſite ſhoe, which cuſtom wears off as they grow ſtrong. Upon the whole, the beſt general rule that can be laid down for preventing horſes from cutting their legs, is to keep their hoofs round and ſhort at the toe, and from growing too large and broad: to obſerve that the ſhoe does not project over the inſide edge of the hoof; that the clenches or rivets of the nails on the outer ſurface of the cruſt are ſmooth; and, above all, that the ſhoe be made light, well worked, and properly proportioned to the ſize of the foot. See the following head.

SECT. XLVII. SHOEING *of* HORSES.

HORSES are ſhoed in order to defend and preſerve their hoofs. As feet differ, ſo ſhould ſhoes accordingly. "The only ſyſtem of farriers, (Lord Pembroke obſerves), is to ſhoe in general with exceſſive heavy and clumſy ill-ſhaped ſhoes, and very many nails, to the total deſtruction of the foot. The cramps they annex, tend to deſtroy the bullet; and the ſhoes made in the ſhape of a walnut-ſhell prevent the horſe's walking upon the firm baſis which God has given him for that end, and thereby oblige him to ſtumble and fall. They totally pare away alſo and lay bare the inſide of the animal's foot with their deteſtable butteries, and afterwards put on very long ſhoes, whereby the foot is hindered from having any preſſure at all upon the heels, which preſſure otherwiſe might ſtill perchance, notwithſtanding their dreadful cutting, keep the heels properly open, and the foot in good order. The frog ſhould never be cut out; but as it will ſometimes become ragged, it muſt be cleaned every now and then, and the ragged pieces pared off with a knife. In one kind of foot indeed a conſiderable cutting away muſt be allowed of, but not of the frog: we mean, that very high feet muſt be cut down to a proper height; becauſe, if they were not, the frog, though not cut, would ſtill be ſo far above the ground, as not to have any bearing upon it, whereby the great tendon muſt inevitably be damaged, and conſequently the horſe would go lame.

"The weight of ſhoes muſt greatly depend on the quality and hardneſs of the iron. If the iron be very good, it will not bend: and in this caſe the ſhoes cannot poſſibly be made too light: care, however, muſt be taken, that they be of a thickneſs ſo as not to bend; for bending would force out the nails, and ruin the hoof. That part of the ſhoe which is next the horſe's heel, muſt be narrower than any other, (as is ſeen in the draught, Plate CLXXXIX.) that ſtones may be thereby prevented from getting under it, and ſticking there: which otherwiſe would be the caſe; becauſe the iron, when it advances inwardly beyond the bearing of the foot, forms a cavity, wherein ſtones being lodged would remain and, by preſſing againſt the foot, lame the horſe. The part of the ſhoe which the horſe walks upon ſhould be quite flat, and the inſide of it likewiſe; only juſt ſpace enough being left next the foot to put in a picker (which ought to be uſed every time the horſe comes into the ſtable), and alſo to prevent the ſhoe's preſſing upon the ſole. Four nails on each ſide hold better than a greater number, and keep the hoof in a far better ſtate. The toe of the horſe muſt be cut ſhort, and nearly ſquare (the angles only rounded off); nor muſt any nails be driven there: this method prevents much ſtumbling, eſpecially in deſcents; and ſerves, by throwing nouriſhment to the heels, to ſtrengthen them: on them the horſe ſhould in ſome meaſure walk, and the ſhoe be made of a proper length accordingly; by this means, narrow heels are prevented, and many other good effects produced. Many people drive a nail at the toe, but it is an abſurd practice. Leaving room to drive one there cauſes the foot to be of an improper length; and moreover, that part of the hoof is naturally ſo brittle, that even when it is kept well greaſed, the nail there ſeldom ſtays in, but tears out and damages the hoof. That the directions for ſhoeing a proper length may be the more clear and intelligible, we have annexed a draught of a foot ſhoed a proper length ſtanding on a plain ſurface, and with it a draught of the right kind of ſhoe.

"In wet, ſpungy, and ſoft ground, where the foot ſinks in, the preſſure upon the heels is of courſe greater than on hard ground; and ſo indeed it ſhould be upon all accounts. The hinder feet muſt be treated in the ſame manner as the fore-ones; and the ſhoes the ſame; except in hilly and ſlippery countries, they may not improperly be turned up a little behind; but turning up the fore-ſhoes is of no ſervice, and is certain ruin to the fore-legs, eſpecially to the bullets. In deſcending hills, cramps are apt to throw horſes down, by ſtopping the fore-legs, out of their proper baſis and natural bearing, when the hinder ones are rapidly preſſed; which unavoidably muſt be the caſe, and conſequently cannot but puſh the horſe upon his noſe. With them on a plain ſurface, a horſe's foot is always thrown forwards on the toe, out of its proper bearing, which is very liable to make the horſe ſtumble. The notion of their utility in going up hills is a falſe one. In aſcending, the toe is the firſt part of the foot which bears on, takes hold of the ground, and whether the horſe draws or carries, conſequently the buſineſs is done before the part where the cramps are comes to the ground. Ice-nails are preferable to any thing to prevent ſlipping, as alſo to help horſes up hill, the moſt forward ones taking hold of the ground early, conſiderably before the heels touch the ground: they muſt be ſo made, as to be, when driven in, ſcarce half an inch above the ſhoe, and alſo have four ſides ending at the top in a point. They are of great ſervice to prevent ſlipping on all kinds of places; and by means of them a horſe is not thrown out of his proper baſis. They muſt be made of very good iron; if they are not, the heads of them will be perpetually breaking off. From the race-horſe to the cart horſe, the ſame ſyſtem of ſhoeing ſhould be obſerved. The ſize, thickneſs, and weight of them only ſhould differ. The ſhoe of a race-horſe muſt of courſe be lighter than that of a ſaddle-horſe; that of a ſaddle-horſe lighter than that of a coach or bat horſe; and theſe laſt more ſo than a cart, waggon, or artillery-horſe. At preſent all ſhoes in general are too heavy; if the iron is good, ſhoes need not be ſo thick as they are now generally made.—The utmoſt ſeverity ought to be inflicted upon all thoſe who clap ſhoes on hot: this unpardonable lazineſs of farriers in making feet thus fit ſhoes, inſtead of ſhoes fitting feet, dries up the hoof, and utterly deſtroys them. Frequent removals of ſhoes are detrimental, and tear the foot; but ſometimes they are very neceſſary: this is an inconvenience which half-ſhoes are liable to; for the end of the ſhoe, being very ſhort, is apt to work ſoon into the foot, and conſequently muſt then be moved.”

In a late treatiſe on this ſubject by Mr Clark of Edinburgh, the common form of ſhoes, and method of ſhoeing, are, with great appearance of reaſon, totally condemned, and a new form and method recommended, which ſeem founded on rational principles, and to have been confirmed by experience.

Common method. “In preparing the foot for the ſhoe, our author obſerves, the frog, the ſole, and the bars or binders, are pared ſo much that the blood frequently appears. The ſhoe by its form (being thick on the inſide of the rim, and thin upon the outſide*), muſt of conſequence be made concave or hollow on that ſide which is placed immediately next the foot, in order to prevent its reſting upon the ſole. The ſhoes are generally of an immoderate weight and length, and every means is uſed to prevent the frog from reſting upon the ground, by making the ſhoe-heels thick, broad, and ſtrong, or raiſing cramps or caukers on them.

* See Plate CLXXXIX.

“From this form of the ſhoe, and from this method of treating the hoof, the frog is raiſed to a conſiderable height above the ground, the heels are deprived of that ſubſtance which was provided by nature to keep the cruſt extended at a proper wideneſs, and the foot is fixed as it were in a mould.

“By the preſſure from the weight of the body, and reſiſtance from the outer edges of the ſhoe, the heels are forced together, and retain that ſhape impreſſed upon them, which it is impoſſible ever afterwards to remove; hence a contraction of the heels, and of courſe lameneſs. But farther.

“The heels, as has been obſerved, being forced together, the cruſt preſſes upon the proceſſes of the coffin and extremities of the nut-bone: The frog is confined, and raiſed ſo far from the ground, that it cannot have that ſupport upon it which it ought to have: the circulation of the blood is impeded, and a waſting of the frog, and frequently of the whole foot, enſues. Hence proceed all thoſe diſeaſes of the feet, known by the names of *foundered, hoof-bound, narrow-heels, running thruſhes, corns, high ſoles, &c.*

“I have likewiſe frequently obſerved, from this compreſſion of the internal parts of the foot, a ſwelling of the legs immediately above the hoof, attended with great pain and inflammation, with a diſcharge of thin, ichorous, fetid matter: from which ſymptoms, it is often concluded, that the horſe is in a bad habit of body (or what is termed a *greaſe falling down*), and muſt therefore undergo a courſe of medicine, &c.

“The bad effects of this practice are ſtill more obvious upon the external parts of the hoof. The cruſt toward the toe, being the only part of the hoof free from compreſſion, enjoys a free circulation of that fluid neceſſary for its nouriſhment, and grows broader and longer; from which extraordinary length of toe, the horſe ſtumbles in his going, and cuts his legs. The ſmaller particles of ſand inſinuate themſelves between the ſhoe and the heels, which grind them away, and thereby produce lameneſs. All this is entirely owing to the great ſpring the heels of the horſe muſt unavoidably have upon the heels of a ſhoe made in this form.

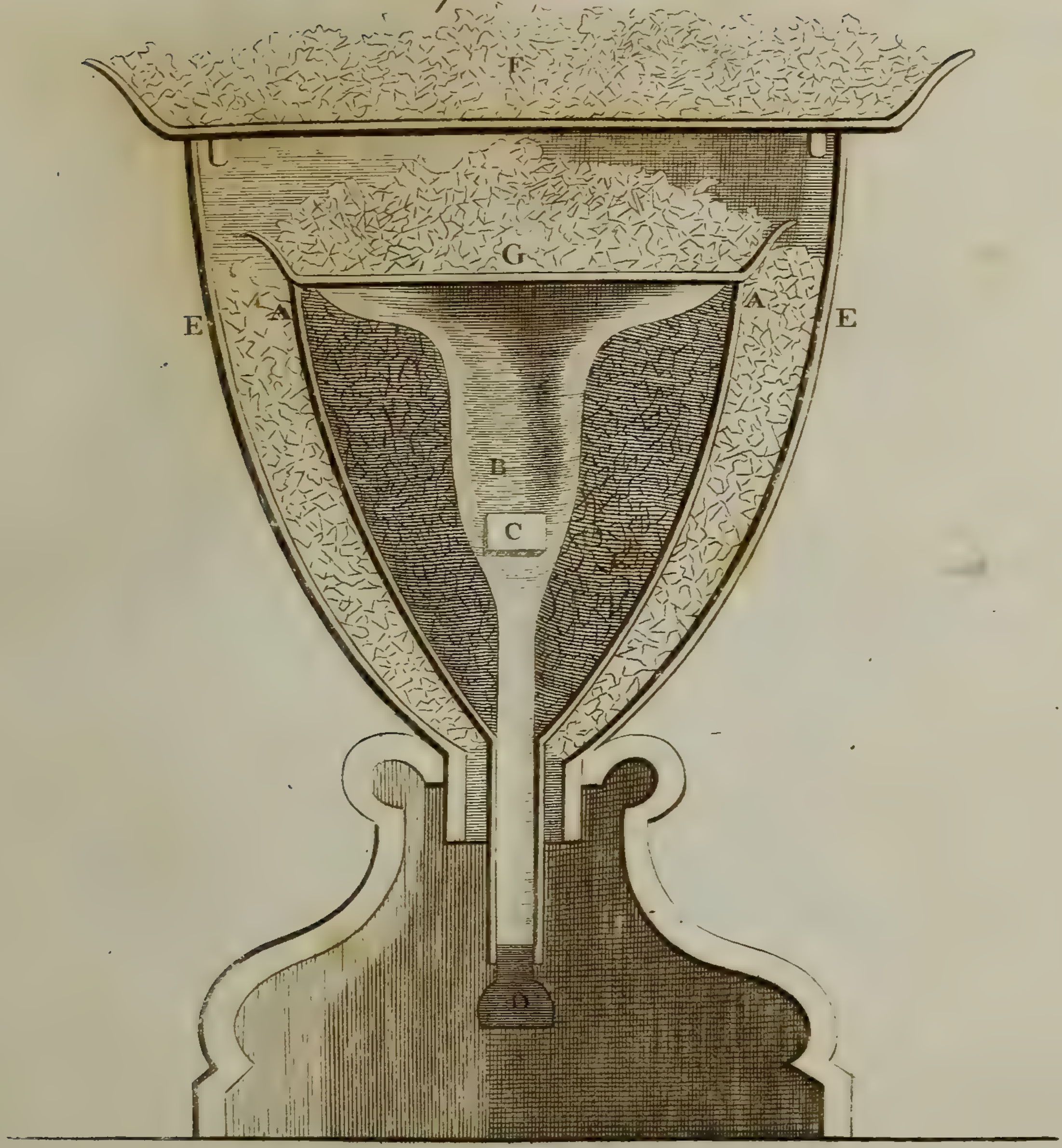
“This concave ſhoe in time wears thin at the toe, and, yielding to the preſſure made upon it, is forced wider, and of conſequence breaks off all that part of the cruſt on the outſide of the nails. Inſtances of this kind daily occur, inſomuch that there hardly remains cruſt ſufficient to fix a ſhoe upon.

“It is generally thought, that the broader a ſhoe is, and the more it covers the ſole and frog, a horſe will travel the better. But, as has been formerly remarked, the broader a ſhoe is of this form, it muſt be made the more concave; and, of conſequence, the contracting power upon the heels muſt be the greater. It is likewiſe to be obſerved, that, by uſing ſtrong broad-rimmed concave ſhoes in the ſummer-ſeaſon, when the weather is hot and the roads very dry and hard, if a horſe is obliged to ride faſt, the ſhoes, by repeated ſtrokes (or friction) againſt the ground, acquire a great degree of heat, which is communicated to the internal parts of the foot; and, together with the contraction upon the heels occaſioned by the form of the ſhoe, muſt certainly cauſe exquiſite pain. This is frequently ſucceeded by a violent inflammation in the internal parts of the hoof, and is the cauſe of that diſeaſe in the feet ſo fatal to the very beſt of our horſes, commonly termed a *founder*. This is alſo the reaſon why horſes, after a journey or a hard ride, are obſerved to ſhift their feet ſo frequently, and to lie down much.

“If we attend further to the convex ſurface of this ſhoe, and the convexity of the pavement upon

Evaporation.

Plate CLXXXIX.



FARRIERY,

Horse-Shoes.

Fig. 1.

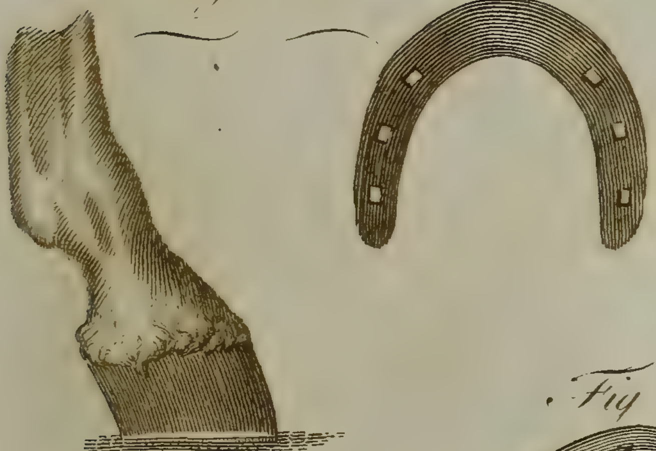


Fig. 2.

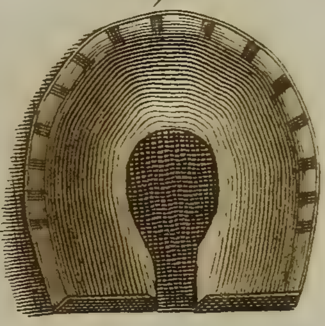


Fig. 3.

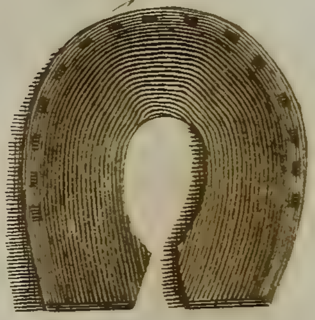


Fig. 4.

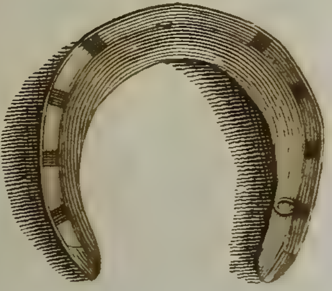
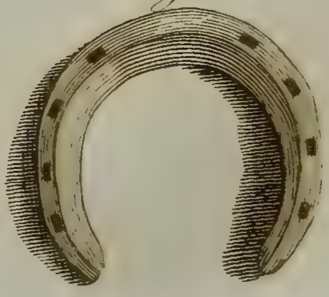


Fig. 5.



way of going, and be a means of making him ſurer-footed. It is likewiſe evident, that, from this ſhoe, the hoof cannot acquire any bad form; when, at the ſame time, it receives every advantage that poſſibly could be expected from ſhoeing. In this reſpect it may very properly be ſaid, that we make the ſhoe to the foot, and not the foot to the ſhoe, as is but too much the caſe in the concave ſhoes, where the foot very much reſembles that of a cat's fixed in a walnut-ſhell.

" It is to be obſerved, that the hoofs of young horſes, before they are ſhoed, for the moſt part are wide and open at the heels, and that the cruſt is ſufficiently thick and ſtrong to admit of the nails being fixed very near the extremities of each. But, as I have formerly remarked, from the conſtant uſe of concave ſhoes, the cruſt of this part of the foot grows thinner and weaker; and when the nails are fixed too far back, eſpecially upon the inſide, the horſe becomes lame: to avoid this, they are placed more towards the fore-part of the hoof. This cauſes the heels of the horſe to have the greater ſpring upon the heels of the ſhoe, which is ſo very detrimental as to occaſion lameneſs; whereas, by uſing this flat form of ſhoe, all theſe inconveniences are avoided; and if the hoofs of young horſes, from the firſt time that they were ſhoed, were continued to be conſtantly treated according to the method here recommended, the heels would always retain their natural ſtrength and ſhape.

" By following this flat method of ſhoeing, and manner of treating the hoofs, ſeveral horſes now under my care, that were formerly tender-footed, and frequently lame, while ſhoed with broad concave ſhoes, are now quite ſound, and their hoofs in as good condition as when the firſt ſhoes were put upon them: In particular, the horſe that wore the broad concave ſhoes, from which the drawings of fig. 2. and 3. were taken, now goes perfectly ſound in the open narrow kind of ſhoes, as repreſented fig. 4. 5.

" If farriers conſidered attentively the deſign of ſhoeing horſes, and would take pains to make themſelves acquainted with the anatomical ſtructure of the foot, they would then be convinced, that this method of treating the hoofs, and this form of ſhoe is preferable to that which is ſo generally practiſed.

" It has been alledged, that in this form of ſhoe horſes do not go ſo well as in that commonly uſed. This objection will eaſily be laid aſide, by attending to the following particulars. There are but few practitioners that can or will endeavour to make this ſort of ſhoe as it ought to be. The iron, in forming it, does not ſo eaſily turn into the circular ſhape neceſſary as in the common ſhoe; and perhaps this is the principal reaſon why farriers object to it, eſpecially where they work much by the piece. And as many horſes that are commonly ſhoed with concave ſhoes have their ſoles conſiderable higher than the cruſt, if the ſhoe is not properly formed, or if it is made too flat, it muſt unavoidably reſt upon the ſole, and occaſion lameneſs.

" The practice of paring the ſole and frog is alſo ſo prevalent, and thought ſo abſolutely neceſſary, that it is indiſcriminately practiſed, even to exceſs, on all kinds of feet: and while this method continues to be followed, it cannot be expected that horſes can go upon hard ground (on this open ſhoe) with that freedom they would do if their ſoles and frogs were allowed to remain in their full natural ſtrength.

" Experience teaches us, that, in very thin-ſoled ſhoes, we feel an acute pain from every ſharp pointed ſtone we happen to tread upon. Horſes are ſenſible of the ſame thing in their feet, when their ſoles, &c. are pared too thin. Hence they who are prejudiced againſt this method, without ever reflecting upon the thin ſtate of the ſole, &c. are apt to condemn it, and draw their concluſions more from outward appearances than from any reaſoning or knowledge of the ſtructure of the parts. From a due attention likewiſe to the ſtructure of a horſe's foot it in a natural ſtate, it will be obvious, that paring away the ſole, frog, &c. muſt be hurtful, and in reality is deſtroying that ſubſtance provided by nature for the defence of the internal parts of the foot: From ſuch practice it muſt be more liable to accidents from hard bodies, ſuch as ſharp ſtones, nails, glaſs, &c. From this conſideration we will likewiſe find, that a narrow piece of iron adapted to the ſhape and ſize of the foot, is the only thing neceſſary to protect the cruſt from breaking or wearing away; the ſole, &c. requiring no defence if never pared.

" There is one obſervation I would farther make, which is, that the ſhoe ſhould be made of good iron, well worked, or what ſmiths call *hammer-hardened*, that is, beat all over lightly with a hammer when almoſt cold. The Spaniards and Portugueſe farriers uſe this practice greatly, inſomuch that many people, who have ſeen them at work, have reported that they form their horſes ſhoes without heating them in the fire as we do. It is well known, that heating of iron till it is red ſoftens it greatly; and when ſhoes thus ſoftened are put upon horſes feet, they wear away like lead. But when the ſhoes are well hammered, the iron becomes more compact, firm, and hard; ſo that a well-hammered ſhoe, though made conſiderably lighter, yet will laſt as long as one that is made heavier, the advantage of which is obvious, as the horſe will move his feet with more activity, and be in leſs danger of cutting his legs.

" The common concave ſhoes are very faulty in this reſpect; for, in fitting or ſhaping them to the foot, they require to be frequently heated, in order to make them bend to the unequal ſurface which the hoof acquires from the conſtant uſe of theſe ſhoes: they thereby become ſoft; and to attempt to harden them by beating or hammering when they are ſhaped to the foot would undo the whole. But flat ſhoes, by making them, when heated, a little narrower than the foot, will, by means of hammering, become wider, and acquire a degree of elaſticity and firmneſs which it is neceſſary they ſhould have, but impoſſible to be given them by any other means whatever; ſo that any farrier, from practice, will ſoon be able to judge, from the quality of the iron, how much a ſhoe, in fitting it to the circumference of the hoof, will ſtretch by hammering when it is almoſt cold: this operation, in fitting flat ſhoes, will be the leſs difficult, eſpecially when it is conſidered, that as there are no inequalities on the ſurface of the hoof (or at leaſt ought not to be) which require to be bended thereto, ſhoes of this kind only require to be made ſmooth and flat;

hence

Shoeing.

hence they will preſs equally upon the circumference or cruſt of the hoof, which is the natural tread of a horſe."

When the roads, &c. are covered with ice, it becomes neceſſary to have the heels of the ſhoes turned up, and frequently ſharpened, in order to prevent horſes from ſlipping and falling. As this cannot be done without the frequent moving of the ſhoes, which breaks and deſtroys the cruſt of the hoofs where the nails are drove, to prevent this, it is recommended to thoſe who are willing to be at the expence, to have ſteel points ſcrewed into the heels or quarters of each ſhoe, which might be taken out and put in occaſionally.

The method of doing this properly, as directed by Mr Clark, is firſt to have the ſhoes fitted to the ſhape of the hoof, then to make a ſmall round hole in the extremity of each heel or in the quarters, about three-eights of an inch in diameter, or more, in proportion to the breadth and ſize of the ſhoe; in each of theſe holes a ſcrew is to be made; the ſteel points are likewiſe to have a ſcrew on them, exactly fitted to that in the ſhoes. Care muſt be taken that the ſcrew on the points is no longer, when they are ſcrewed into the ſhoe, than the thickneſs of the latter. The ſteel points are to be made ſharp; they may either be made ſquare, triangular, or chiſſel pointed, as may be moſt agreeable; the height of the point above the ſhoe ſhould not exceed half an inch for a ſaddle-horſe; they may be made higher for a draught horſe. The key or handle that is neceſſary to ſcrew them in and out occaſionally, is made in the ſhape of the capital letter T, and of a ſufficient ſize and ſtrength; at the bottom of the handle, a ſocket or cavity muſt be made, properly adapted to the ſhape of the ſteel point, and ſo deep as to receive the whole head of the point that is above the ſhoe. In order to prevent the ſcrew from breaking at the neck, it will be neceſſary to make it of a gradual taper; the ſame is likewiſe to be obſerved of the female ſcrew that receives it, that is, the hole muſt be wider on the upper part of the ſhoe than the under part; the ſharp points may be tempered or hardened, in order to prevent them from growing too ſoon blunt; but when they become blunt, they may be ſharpened as at firſt. Theſe points ſhould be unſcrewed when the horſe is put into the ſtable, as the ſtones will do them more injury in a few minutes than a days riding on ice. A draught horſe ſhould have one point on each ſhoe, as that gives them firmer footing in drawing on ice; but for a ſaddle horſe, when they are put there, they are apt to make him trip and ſtumble.

When the ſhoes are provided with theſe points, a horſe will travel on ice with the greateſt ſecurity and ſteadineſs, much more ſo than on cauſeway or turnpike roads, as the weight of the horſe preſſes them down in the ice at every ſtep he makes.

Farthing, Faſces.

FARTHING, a ſmall Engliſh copper coin, amounting to one-fourth of a penny. It was anciently called *fourthing*, as being the fourth of the integer or penny.

Farthing of Gold, a coin uſed in ancient times, containing in value the fourth part of a noble, or 20d. ſilver. It is mentioned in the ſtat. 9 Hen. V. cap. 7. where it is enacted, that there ſhall be good and juſt weight of the noble, half noble, and farthing of gold.

Farthing of Land ſeems to differ from FARDING-*deal*. For in a ſurvey-book of the manor of Weſt-Hapton in Devonſhire, there is an entry thus: A. B. holds ſix farthings of land at 126l. *per ann.* So that the farthing of land muſt have been a conſiderable quantity, far more than a rood.

FASCES, in Roman antiquity, axes tied up together with rods, or ſtaves, and borne before the Roman magiſtrates as a badge of their office and authority.

According to Florus, the uſe of the faſces was introduced by the elder Tarquin the fifth king of Rome; and were then the mark of the ſovereign dignity. In after-times they were borne before the conſuls, but by turns only, each his day; they had each of them 12, borne by as many lictors. Theſe faſces conſiſted of branches of elm; having in the middle a ſecuris or axe, the head of which ſtood out beyond the reſt. Publicola took the axe out of the faſces, as Plutarch aſſures us, to remove from the people all occaſion of terror. After the conſuls, the pretors aſſumed the faſces. In the government of the decemvirs, it was the practice at firſt for only one of them to have the faſces. Afterwards each of them had twelve, after the manner of the kings.

Faſcets, Faſciæ.

When the magiſtrates who by right had the axes carried before them, had a mind to ſhow ſome deference to the people, or ſome perſon of ſingular merit, they either ſent away the lictors, or commanded them to lower the faſces before them, which was called *ſubmittere faſces*. Many inſtances of this occur in Roman hiſtory.

FASCETS, in the art of making glaſs, are the irons thruſt into the mouths of bottles, in order to convey them to the annealing tower.

FASCIA, in antiquity, a thin ſaſh which the Roman women wrapped round their bodies, next to the ſkin, in order to make them ſlender. Something of this ſort ſeems alſo to have been in uſe amongſt the Grecian ladies, if we can depend upon the repreſentation given by Terence, Eun. Act. 2. Sc. 4.

> *Haud ſimilis eſt virginum noſtrarum, quas matres ſtudent*
> *Demiſſis humeris eſſe---vincto corpore, ut graciles fiant.*

Fascia, in architecture, ſignifies any flat member having a conſiderable breadth, and but a ſmall projecture, as the band of an architrave, larmier, &c. In brick buildings, the juttings out of the bricks beyond the windows in the ſeveral ſtories except the higheſt, are called *faſcias*, or *faſciæ*.

Fascia Lata, in anatomy, a muſcle of the leg, called alſo *ſemi-membranoſus*. See Anatomy, *Table of the Muſcles*.

Fasciæ, in aſtronomy, the belts ſeen on the diſk of the ſuperior planets Mars, Jupiter, and Saturn. See Astronomy *paſſim*.

FASCIALIS, in anatomy, one of the muſcles of the thigh, called *ſartorius*. See ANATOMY, *Table of the Muſcles*.

FASCINATION (from the Greek *βασκαινειν*, to *facinate* or *bewitch)*, a ſort of witchcraft ſuppoſed to operate either by the eye or the tongue.

Ancient writers diſtinguiſh two ſorts of faſcination, one performed by looking, or the efficacy of the eye. Such is that ſpoken of by Virgil in his third eclogue :

> *Neſcio quis teneros oculus mihi* faſcinat *agnos.*

The ſecond by words, and eſpecially malignant praiſes. Such is that mentioned by the ſame poet in his ſeventh eclogue :

> *Aut, ſi ultra placitum laudârit, baccare frontem*
> *Cingite, ne vati noceat mala lingua futuro.*

Horace touches on both kinds in his firſt book of epiſtles :

> *Non iſtic obliquo oculo mea commodo quiſquam*
> *Limat, non odio obſcuro, morſuque venenat.*

FASCINES, in fortification, faggots of ſmall wood, of about a foot diameter, and ſix feet long, bound in the middle, and at both ends. They are uſed in raiſing batteries, making chandeliers, in filling up the moat to facilitate the paſſage to the wall, in binding the ramparts where the earth is bad, and in making parapets of trenches to ſcreen the men. Some of them are dipped in melted pitch or tar ; and, being ſet on fire, ſerve to burn the enemy's lodgments or other works.

In the corrupt Latin they uſe *facennia, faſcennia*, and *faſcinata*, &c. to ſignify the pales, faſcines, &c. uſed to incloſe the ancient caſtles, &c.

FASCIOLA, in zoology, the FLUKE or GOURD WORM : A genus of inſects of the order of vermes inteſtina ; of which the characters are theſe : The body is flattiſh, and has a vent hole at the extremity and on the belly. There are ſeveral ſpecies. 1. The hepatica, or liverfluke, grows to two thirds of an inch in length, though it is more uſually met with not half that ſize ; and its breadth is nearly equal to two thirds of its length ; it is flattiſh, but ſomewhat rounded on the back, and has about eight deep longitudinal furrows in two ſeries ; its ſkin is ſoft and whitiſh, with a tinge of brown. The hinder part is rounded, the fore part is furniſhed with a large mouth ; it bears ſome reſemblance to the ſeed of the common gourd, whence it has acquired the name of the *gourd worm*. It is found in freſh waters, in ditches, at the roots of ſtones, ſometimes in the inteſtines, and often in the ſubſtance of the other viſcera in quadrupeds. It often infeſts the liver of ſheep, and on that account is called *hepatica*. Bags with ſalt in them ſhould be placed in the fold that the ſheep might lick them, which is the only remedy. 2. The inteſtinalis, or Inteſtinal Fluke, is of a long ſlender form, if extended ; when contracted, of a ſuboval form. Inhabits the inteſtines of freſh-water fiſh ; often found in breams. 3. The barbata is white, with tranſverſe papillæ in the mouth. It is of an oblong ſhape, and about the ſize of a cucumber-ſeed. It is found in the inteſtines of the ſepia lotigo.

Plate CXC.

FASHION-PIECES, in the ſea-language, the aftmoſt or hindmoſt timbers of a ſhip, which terminate the breadth, and form the ſhape of the ſtern. They are united to the ſtern-poſt, and to the extremity of the wing-tranſom, by a rabbit, and a number of ſtrong nails or ſpikes driven from without.

FAST, in general, denotes the abſtinence from food, (ſee FASTING) ; but is more particularly uſed for ſuch abſtinence on a religious account.

Religious faſting has been practiſed by moſt nations from the remoteſt antiquity. Some divines even pretend its origin in the earthly paradiſe, where our firſt parents were forbidden to eat of the tree of knowledge. But though this ſeems carrying the matter too far, it is certain, that the Jewiſh church has obſerved faſts ever ſince its firſt inſtitution. Nor were the neighbouring heathens, viz. the Egyptians, Phœnicians, and Aſſyrians, without their faſts. The Egyptians, according to Herodotus, ſacrificed a cow to Iſis, after having prepared themſelves by faſting and prayer : a cuſtom which he likewiſe aſcribes to the women of Cyrene. Porphyry affirms, that the Egyptians, before their ſtated ſacrifices, always faſted a great many days, ſometimes for ſix weeks ; and that the leaſt behoved to be for ſeven days : during all which time the prieſts and devotees, not only abſtained from fleſh, fiſh, wine, and oil ; but even from bread, and ſome kinds of pulſe. Theſe auſterities were communicated by them to the Greeks, who obſerved their faſts much in the ſame manner. The Athenians had the Eleuſinian and Theſmophorian faſts, the obſervation of which was very rigorous, eſpecially among the women, who ſpent one whole day ſitting on the ground in a mournful dreſs, without taking any nouriſhment. In the iſland of Crete, the prieſts of Jupiter were obliged to abſtain all their lives from fiſh, fleſh, and baked meats. Apuleius informs us, that whoever had a mind to be initiated in the myſteries of Cybele, were obliged to prepare themſelves by faſting ten days ; and, in ſhort, all the pagan dieties, whether male or female, required this duty of thoſe that deſired to be initiated into their myſteries, of their prieſts and prieſteſſes that gave the oracles, and of thoſe that came to conſult them.

Among the heathens faſting was alſo practiſed before ſome of their military enterpriſes. Ariſtotle informs us, that the Lacedemonians having reſolved to ſuccour a city of the allies, ordained a faſt throughout the whole extent of their dominions, without excepting even the domeſtic animals : and this they did for two ends ; one to ſpare proviſions in favour of the beſieged, the other to draw down the bleſſing of heaven upon their enterpriſe. The inhabitants of Tarentum, when beſieged by the Romans, demanded ſuccours from their neighbours of Rhegium, who immediately commanded a faſt throughout their whole territories. Their enterpriſe having had good ſucceſs by their throwing a ſupply of proviſions into the town, the Romans were obliged to raiſe the ſiege ; and the Tarentines, in memory of this deliverance, inſtituted a perpetual faſt.

Faſting has always been reckoned a particular duty among philoſophers and religious people, ſome of whom have carried their abſtinence to an incredible length. At Rome it was practiſed by kings and emperors themſelves. Numa Pompilius, Julius Cæſar, Auguſtus, Veſpaſian, and others, we are told, had their ſtated faſt-days : and Julian the apoſtate was ſo exact in this obſervance as to outdo the prieſts themſelves, and even the moſt rigid philoſophers. The Pythagoreans kept a continual lent; but with this difference, that they believed the uſe of fiſh to be equally unlawful with that of fleſh. Beſides their conſtant temperance, they alſo frequently faſted rigidly for a very long time. In this reſpect, however, they were all outdone by their maſter Pythagoras, who continued his faſts for no leſs than 40 days together. Even Apollonius Tyaneus, one of his moſt famous diſciples, could never come up to him in the length of his faſts, though they greatly exceeded thoſe of the ordinary Pythagoreans. The gymnoſophiſts, or brachmans of the eaſt, are alſo very remarkable for their ſevere faſtings; and the Chineſe, according to father le Comte, having alſo their ſtated faſts, with forms of prayer for preſerving them from barrenneſs, inundations, earthquakes, &c. The Mahometans too, who poſſeſs ſo large a part of Aſia, are very remarkable for the ſtrict obſervance of their faſts; and the exactneſs of their derviſes in this reſpect is extraordinary.

Faſting was often uſed by the heathens for ſuperſtitious purpoſes; ſometimes to procure the interpretations of dreams; at others, to be an antidote againſt their pernicious conſequences. A piece of ſuperſtition prevails to this day among the Jews; who, though expreſsly forbidden to faſt on Sabbath days, think themſelves at liberty to diſpenſe with this duty when they happen to have frightful and unlucky dreams the night preceding, that threatened them with great misfortunes. On theſe occaſions they obſerve a formal faſt the whole day; and at night the patient, having invited three of his friends, addreſſes himſelf to them ſeven times in a very ſolemn manner, ſaying, "May the dream I have had prove a lucky one!" And his friends anſwer as many times, "Amen, may it be lucky, and God make it ſo!" After which, in order to encourage him, they conclude the ceremony with theſe words of Eccleſiaſtes, "Go eat thy bread with joy;" and then ſet themſelves down to table. They have alſo added ſeveral faſts not commanded in the law of Moſes, particularly three, in memory of ſore diſtreſſes their nation has ſuffered at different times. The abſtinence of the ancient Jews commonly laſted 27 or 28 hours at a time; beginning before ſunſet, and not ending till ſome hours after ſunſet next day. On theſe days they were obliged to wear white robes in token of grief and repentance; to cover themſelves with ſackcloth, or their worſt clothes: to lie on aſhes: to ſprinkle them on their head, &c. Some ſpent the whole night and day following in the temple or ſynagogue, in prayers and other devotions, barefooted, with a ſcourge in their hands, of which they ſometimes made a good uſe in order to raiſe their zeal. Laſtly, in order to complete their abſtinence, at night they were to eat nothing but a little bread dipped in water, with ſome ſalt for ſeaſoning; except they choſe to add to their repaſt ſome bitter herbs and pulſe.

The ancients, both Jews and Pagans, had alſo their faſts for purifying the body, particularly the prieſts and ſuch as were any way employed at the altars; for when nocturnal diſorders happened to theſe, it was unlawful for them to approach all the next day, which they were bound to employ in purifying themſelves. On this account, at great feſtivals, where their miniſtry could not be diſpenſed with, it was uſual for them, on the eve thereof, not only to faſt, but alſo to abſtain from ſleep, for the greater certainty. For this purpoſe the high-prieſt had under-officers to wake him, if overtaken with ſleep; againſt which other preſervatives were alſo made uſe of.

FASTERMANS or Fasting-men, q. d. *homines habentes*, was uſed in ancient cuſtoms for men in repute and ſubſtance; or rather for pledges, ſureties, or bondſmen, who, according to the Saxon polity, were faſt bound to anſwer for one another's peaceable behaviour.

FASTI, in Roman antiquity, the kalender wherein were expreſſed the ſeveral days of the year, with their feaſts, games, and other ceremonies.

There were two ſorts of faſti, the greater and leſs; the former being diſtinguiſhed by the appellation *faſti magiſtrales*, and the latter by that of *faſti kalendares*.

1. The *Faſti Kalendares*, which were what was properly and primarily called *faſti*, are defined by Feſtus Pompeius to be books containing a deſcription of the whole year: *i. e.* Ephemerides, or diaries, diſtinguiſhing the ſeveral kinds of days, *feſti*, *profeſti*; *faſti*, *nefaſti*, &c. The author hereof was Numa, who committed the care and direction of the faſti to the pontifex maximus, whom the people uſed to go and conſult on every occaſion. This cuſtom held till the year of Rome 450, when C. Flavius, ſecretary to the pontifices, expoſed in the forum a liſt of all the days whereon it was lawful to work; which was ſo acceptable to the people, that they made him curule ædile.

Theſe leſſer faſti or faſti calendares, were of two kinds, *urbani* and *ruſtici*.

The *faſti urbani*, or faſti of the city, were thoſe which obtained or were obſerved in the city. Some will have them thus called becauſe they were expoſed publicly in divers parts of the city; though, by the various inſcriptions or gravings thereof on antique ſtones, one would imagine that private perſons had them likewiſe in their houſes. Ovid undertook to illuſtrate theſe faſti urbani, and comment on them, in his Libri Faſtorum, whereof we have the ſix firſt books ſtill remaining; the ſix laſt, if ever they were written, being loſt.

In the *faſti ruſtici*, or country faſti, were expreſſed the ſeveral days, feaſts, &c. to be obſerved by the country people: for as theſe were taken up in tilling the ground, fewer feaſts, ſacrifices, ceremonies, and holidays, were enjoined them than the inhabitants of cities; and they had alſo ſome peculiar ones not obſerved at Rome. Theſe ruſtic faſti contained little more than the ceremonies of the calends, nones, and ides: the fairs, ſigns of the zodiac, increaſe and decreaſe of the days, the tutelary gods of each month, and certain directions for rural works to be performed each month.

2. In the greater faſti, or *Faſti Magiſtrales*, were expreſſed the ſeveral feaſts, with every thing relating to the gods, religion, and the magiſtrates; the emperors, their birth-days, offices, days conſecrated to them, and feaſts and ceremonies eſtabliſhed in their honour, or for their proſperity, &c. With a number of ſuch circumſtances did flattery at length ſwell the faſti; when they became denominated *Magni* to diſtinguiſh them from the bare kalender, or faſti kalendares.

Fasti was alſo a chronicle or regiſter of time, wherein in the ſeveral years were denoted by the reſpective conſuls, with the principal events that happened during their conſulates; theſe were called alſo *faſti conſulares*, or *conſular faſti*.

Fasti, or *Dies Faſti* alſo denoted court-days. The word *faſti faſtorum*, is formed of the verb *fari*, "to ſpeak," becauſe during thoſe days the courts were opened, cauſes might be heard and the prætor was allowed *fari*, to pronounce the three words, *do, dico, addico*: The other days wherein this was prohibited were called *nefaſti*: thus Ovid,

Ille nefaſtus erit, per quem tria verba ſilentur:
Faſtus erit, per quem lege licebit agi.

Theſe *dies faſti* were noted in the kalender by the letter *F*: but obſerve, that there were ſome days *ex parte faſti*, partly *faſti*, partly *nefaſti*; i. e. juſtice might be diſtributed at certain times of the day, and not at others. Theſe days were called *interciſi*, and were marked in the kalendar thus; *F. P. faſtos primo*, where juſtice might be demanded during the firſt part of that day.

FASTING, the abſtaining from food. See Fast.

Many wonderful ſtories have been told of extraordinary faſting; great numbers of which undoubtedly muſt be falſe. Others, however, we have on very good authority, of which ſome are mentioned under the article Abstinence. Another we have in the

Fasting Woman. A full account of this very uncommon caſe is given in the Phil. Tranſ. Vol. LXVII. Part I. the ſubſtance of which follows: The woman, whoſe name was *Janet M'Leod*, an inhabitant in the pariſh of Kincardine in Roſsſhire, continued healthy till ſhe was 15 years of age, when ſhe had a pretty ſevere epileptic fit; after this ſhe had an interval of health for four years, and then another epileptic fit which continued a whole day and a night. A few days afterwards ſhe was ſeized with a fever, which continued with violence ſeveral weeks, and from which ſhe did not perfectly recover for ſome months. At this time ſhe loſt the uſe of her eye-lids; ſo that ſhe was under a neceſſity of keeping them open with the fingers of one hand, whenever ſhe wanted to look about her. In other reſpects ſhe continued in pretty good health; only ſhe never had any appearance of menſes, but periodically ſpit up blood in pretty large quantities, and at the ſame time it flowed from the noſe. This diſcharge continued ſeveral years; but at laſt it ceaſed: and ſoon after ſhe had a third epileptic fit, and after that a fever from which ſhe recovered very ſlowly. Six weeks after the criſis, ſhe ſtole out of the houſe unknown to her parents, who were buſied in their harveſt work, and bound the ſheaves of a ridge before ſhe was obſerved. In the evening ſhe took to her bed, complaining much of her *heart* (moſt probably her *ſtomach*, according to the phraſeology of that country) and her head. From that time ſhe never roſe for five years, but was occaſionally lifted out of bed. She ſeldom ſpoke a word, and took ſo little food that it ſeemed ſcarce ſufficient to ſupport a ſucking infant. Even this ſmall quantity was taken by compulſion; and at laſt, about Whitſunday 1763, ſhe totally refuſed every kind of food or drink. Her jaw now became ſo faſt locked, that it was with the greateſt difficulty her father was able to open her teeth a little, in order to admit a ſmall quantity of gruel or whey; but of this ſo much generally run out at the corners of her mouth, that they could not be ſenſible any had been ſwallowed. About this time they got ſome water from a noted medicinal ſpring in Brae-Mar, ſome of which they attempted to make her ſwallow, but without effect. They continued their trials, however, for three mornings; rubbing her throat with the water, which run out at the corners of her mouth. On the third morning durng the operation, ſhe cried out, "Give me more water; and ſwallowed with eaſe all that remained in the bottle. She ſpoke no more intelligibly for a year; though ſhe continued to mutter ſome words which her parents only underſtood, for 14 days. She continued to reject all kinds of food and drink till July 1765. At this time her ſiſter thought, by ſome ſigns ſhe made, that ſhe wanted her jaws opened; and this being done, not without violence, ſhe called intelligibly for a drink, and drank with eaſe about an Engliſh pint of water. Her father then aſked her why ſhe would not make ſome ſigns when ſhe wanted a drink to which ſhe anſwered, why ſhould ſhe when ſhe had no deſire. It was now ſuppoſed that ſhe had regained the faculty of ſpeech; and her jaws were kept open for about three weeks by means of a wedge. But in four or five days ſhe became totally ſilent, and the wedge was removed becauſe it made her lips ſore. She ſtill, however, continued ſenſible; and when her eye-lids were opened, knew every body, as could be gueſſed from the ſigns ſhe made.

By continuing their attempts to force open her jaws, two of the under foreteeth were driven out; and of this opening her parents endeavoured to avail themſelves by putting ſome thin nouriſhing drink into her mouth; but without effect, as it always returned by the corners. Sometimes they thought of thruſting a little dough of oatmeal through this gap of the teeth, which ſhe would retain a few ſeconds, and then return with ſomething like a ſtraining to vomit, without one particle going down. Nor were the family ſenſible of any thing like ſwallowing for four years, excepting the ſmall draught of Brae-Mar water and the Engliſh pint of common water. For the laſt three years ſhe had not any evacuation by ſtool or urine, except that once or twice a-week ſhe paſſed a few drops of urine, about as much, to uſe the expreſſion of her parents, as would wet the ſurface of a halfpenny. In this ſituation ſhe was viſited by Dr Mackenzie, who communicated the account of her caſe to the Royal Society. He found her not at all emaciated: her knees were bent and the hamſtrings tight, ſo that her heels almoſt touched her buttocks. She ſlept much, and was very quiet: but when awake, kept a conſtant whimpering like a new-born weakly infant. She never could remain a moment on her back, but always fell to one ſide or another; and her chin was clapped cloſe, to her breaſt, nor could it by any force be moved backwards.

The doctor paid his firſt viſit in the month of October; and five years afterwards, viz. in October 1772, was induced to pay her a ſecond viſit, by hearing that ſhe was recovering, and had begun to eat and drink. The account given him was moſt extraordinary. Her parents one day returning from their country labours (having left their daughter fixed to her bed as uſual), were greatly ſurpriſed to find her ſitting upon her hams, on the ſide of the houſe oppoſite to her bed-place, ſpinning with her mother's diſtaff. All the food ſhe took at that time was only to crumble a little oat or barley cake in the palm of her hand, as if to feed a chicken. She put little crumbs of this into the gap of her teeth; rolled them about for ſome time in her mouth; and then ſucked out of the palm of her hand a little water, whey, or milk; and this only once or twice a-day, and even that by compulſion. She never attempted to ſpeak; her jaws were faſt locked, and her eyes ſhut. On opening her eye-lids, the balls were found to be turned up under the edge of the os frontis; her countenance was ghaſtly, her complexion pale, and her whole perſon emaciated. She ſeemed ſenſible, and tractable in every thing except in taking food. This ſhe did with the utmoſt reluctance, and even cried before ſhe yielded. The great change of her looks Dr Mackenzie attributed to her ſpinning flax on the diſtaff, which exhauſted too much of the ſaliva; and therefore he recommended to her parents to confine her totally to the ſpinning of wool. In 1775, ſhe was viſited again, and found to be greatly improved in her looks as well as ſtrength; her food was alſo conſiderably increaſed in quantity; though even then ſhe did not take more than would be ſufficient to ſuſtain an infant of two years of age.

The following remarkable inſtances of animals being able to live long without food, are related by Sir William Hamilton in his account of the late earthquakes in Italy, (*Phil. Tranſ.* vol. 73.) "At Soriano (ſays he), two fattened hogs that had remained buried under a heap of ruins, were taken out alive the 42d day; they were lean and weak, but ſoon recovered." Again, "At Meſſina two mules belonging to the Duke de Belviſo remained under a heap of ruins, one of them 22 days, and the other 23 days; they would not eat for ſome days, but drank water plentifully, and are now recovered. There are numberleſs inſtances of dogs remaining many days in the ſame ſituation; and a hen belonging to the Britiſh vice-conſul at Meſſina, that had been cloſely ſhut up under the ruins of his houſe, was taken out the 22d day, and is now recovered; it did not eat for ſome days, but drank freely; it was emaciated, and ſhowed little ſigns of life at firſt. From theſe inſtances, and thoſe related before of the hogs at Soriano, and ſeveral others of the ſame kind that have been related to me, but which being leſs remarkable I omit, one may conclude, that long faſting is always attended with great thirſt and total loſs of appetite."

An inſtance of a ſimilar kind, not leſs remarkable than either of the two preceding, we find in the Gentleman's Magazine for Jan. 1785, communicated by a correſpondent, as follows: "During the heavy ſnow which fell in the night of the 7th of January 1776, a parcel of ſheep belonging to Mr John Wolley, of Matlock, in Derbyſhire, which were paſtured on that part of the Eaſt Moor that lies within the manor of Matlock, were covered with the drifted ſnow: in the courſe of a day or two all the ſheep that were covered with the ſnow were found again, except two, which were conſequently given up as loſt; but on the 14th of February following (ſome time after the break of the ſnow in the valleys, and 38 days after the fall), as a ſervant was walking over a large parcel of drifted ſnow which remained on the declivity of a hill, a dog he had with him diſcovered one of the two ſheep that had been loſt, by winding (or ſcenting) it through a ſmall aperture which the breath of the ſheep had made in the ſnow; the ſervant thereupon dug away the ſnow, and releaſed the captive from its priſon; it immediately ran to a neighbouring ſpring, at which it drank for a conſiderable time, and afterwards rejoined its old companions as though no ſuch accident had befallen it. On inſpecting the place where it was found, it appeared to have ſtood between two large ſtones which lay parallel with each other at about two feet and an half diſtance, and probably were the means of protecting it from the great weight of the ſnow, which in that place lay ſeveral yards thick; from the number of ſtones around it, it did not appear that the ſheep had been able to pick up any food during its confinement. Soon afterwards its owner removed it to ſome low lands; but as it had nearly loſt its appetite, it was fed with bread and milk for ſome time: in about a fortnight after its enlargement it loſt its ſight and wool; but in a few weeks afterwards they both returned again, and in the courſe of the following ſummer it was quite recovered. The remaining ſheep was found dead about a week after the diſcovery of the other."

In the ſame publication † is recorded the death of one Caleb Elliot, a viſionary enthuſiaſt, who meant to have faſted 40 days, and actually ſurvived 16 without food, having obſtinately refuſed ſuſtenance of every kind.

† Suppl. for 1789, Obituary, p. 1211.

FASTOLF (Sir John), a valiant and renowned Engliſh officer, a knight-banneret and of the garter, who ſerved in France under Henry IV. V. and VI. was deſcended from an ancient family in Norfolk, and was born about the year 1377. He was as much diſtinguiſhed for his virtue at home as for his valour abroad; and became no leſs amiable in his private, than he had been admirable in his public character. He died in 1459, upwards of 80 years of age, as we learn from his noted cotemporary William Caxton the firſt Engliſh printer. By an unaccountable miſtake it has been aſſerted, that Shakeſpear's Falſtaff was drawn to ridicule this great man; and this has made judicious biographers more ſtudious to preſerve his reputation.

FAT, an oily concrete ſubſtance depoſited in different parts of animal bodies. See ANATOMY, n° 83.

Strong exerciſe, preternatural heat, an acrimonious ſtate of the juices, and other like cauſes, by which the oily parts of the blood are attenuated, reſolved, or evacuated, prevent the generation of fat; labours of the mind alſo have this effect, as well as labour or intemperature of the body. Hence reſt and plentiful food are ſufficient to fatten brutes; but with men it is often otherwiſe. It is ſurpriſing how ſoon ſome birds grow fat; ortalons in 24 hours, and larks ſtill ſooner.

Fats may be divided, from their conſiſtence, into three kinds: (1.) The ſoft and thin, which grow perfectly liquid in a very ſmall heat; (2.) The thick and conſiſtent, which liquify leſs readily; and, (3.) The hard and firm, which require a ſtill ſtronger heat to melt them. The firſt is called *Pinguedo;* the ſecond, *Auxungia*; and the third, *Adeps*, as taken from the animal; and *Sebum*, or *Sevum*, when freed from the ſkins, &c. This uſe of the names, however, is not conſtant, ſome employing them differently.

A great number of fats have been kept in the ſhops, for making ointments, plaſters, and other medicinal compoſitions; as hog's lard, the fat of the boar, the fox, the hair, dog, wild cat, Alpine mouſe, beaver; that of hens, ducks, geeſe, ſtorks; of the whale, pike, ſerpents, viper, &c. as alſo human fat. In regard to all theſe kind of ſubſtances, however, much depends upon the manner of purifying or trying, and of keeping them.

To obtain fat pure, it muſt be cut into pieces, and cleaned from the interpoſed membranes and veſſels. It muſt then be cleanſed from its gelatinous matter by waſhing with water, till the water comes from it colourleſs and inſipid; it is afterwards to be melted with a moderate heat in a proper veſſel with a little water; and it is to be kept thus melted till the water be entirely evaporated, which is known by the diſcontinuance of the boiling, which is cauſed by the water only, and which laſts till not a drop of it remains: it is afterwards to be put into an earthen pot, where it fixes; then it is exceedingly white, ſufficiently pure for the purpoſes of pharmacy or chemical examination.

Fat thus purified has very little taſte, and a weak, but peculiar, ſmell.

For the analyſis, chemical properties, &c. of fat, ſee CHEMISTRY, n° 1015. and 1428.

One of the chief uſes of fat probably is, to receive into its compoſition, to blunt and correct, a great part of the acids of the aliments, and which are more than are requiſite to the compoſition of the nutritive juice, or which nature could not otherwiſe expel. This is certain, that the greater the quantity of aliments is taken by healthy animals above what is neceſſary for their nouriſhment and reproduction, the fatter they become. Hence animals which are caſtrated, which are not much exerciſed, or which are come to an age when the loſs and production of the ſeminal fluid is leſs, and which at the ſame time conſume much ſucculent aliment, generally become fatter, and ſometimes exceedingly ſo.

Although fat be very different from truly animaliſed ſubſtances, and appears not eaſily convertible into nutritive juices, it being generally difficult of digeſtion, and apt to become rancid, as butter does in the ſtomachs of many perſons; yet in certain caſes it ſerves to the nouriſhment and reparation of the body. Animals certainly become lean, and live upon their fat, when they have too little food, and when they have diſeaſes which prevent digeſtion and the production of the nutritive juice; and in theſe caſes the fatter animals hold out longer than the leaner. The fat appears to be then abſorbed by the veſſels deſigned for this uſe, and to be transformed into nutritive juice.

FAT, in the ſea-language, ſignifies the ſame with broad. Thus a ſhip is ſaid to have a fat quarter, if the truſſing-in or tuck of her quarter be deep.

FAT likewiſe denotes an uncertain meaſure of capacity. Thus a fat of iſinglaſs contains from 3¼ hundred weight to 4 hundred weight; a fat of unbound books, half a maund or four bales; of wire, from 20 to 25 hundred weight; and of yarn, from 220 to 221 bundles.

FAT, or VAT, is uſed alſo for ſeveral utenſils: as, 1. A great wooden veſſel, employed for the meaſuring of malt, and containing a quarter or eight buſhels. 2. A large brewing veſſel, uſed by brewers to run their wort in. 3. A leaden pan or veſſel for the making of ſalt at Droitwich.

FATA MORGANA, a very remarkable aerial phenomenon, which is ſometimes obſerved from the harbour of Meſſina and adjacent places, at a certain height in the atmoſphere. The name, which ſignifies the *Fairy Morgana*, is derived from an opinion of the ſuperſtitious Sicilians, that the whole ſpectacle is produced by fairies, or ſuch like viſionary inviſible beings. The populace are delighted whenever it appears; and run about the ſtreets ſhouting for joy, calling every body out to partake of the glorious ſight.

This ſingular meteor has been deſcribed by various authors; but the firſt who mentioned it with any degree of preciſion was Father Angelucci, whoſe account is thus quoted by Mr Swinburne in his *Tour through Sicily*: "On the 15th of Auguſt 1643, as I ſtood at my window, I was ſurpriſed with a moſt wonderful delectable viſion. The ſea that waſhes the Sicilian ſhore ſwelled up, and became, for ten miles in length, like a chain of dark mountains; while the waters near our Calabrian coaſt grew quite ſmooth, and in an inſtant appeared as one clear poliſhed mirror, reclining againſt the aforeſaid ridge. On this glaſs was depicted, in *chiaro ſcuro*, a ſtring of ſeveral thouſands of pilaſtres, all equal in altitude, diſtance, and degree of light and ſhade. In a moment they loſt half their height, and bent into arcades, like Roman aqueducts. A long cornice was next formed on the top, and above it roſe caſtles innumerable, all perfectly alike. Theſe ſoon ſplit into towers, which were ſhortly after loſt in colonnades, then windows, and at laſt ended in pines, cypreſſes, and other trees, even and ſimilar. This is the Fata Morgana, which for 26 years I had thought a mere fable."

To produce this pleaſing deception, many circumſtances muſt concur, which are not known to exiſt in any other ſituation. The ſpectator muſt ſtand with his back to the eaſt, in ſome elevated place behind the city, that he may command a view of the whole bay; beyond which the mountains of Meſſina riſe like a wall, and darken the back ground of the picture. The winds muſt be huſhed, the ſurface quite ſmoothed, the tide at its height, and the waters preſſed up by currents to a great elevation in the middle of the channel. All theſe events coinciding, as ſoon as the ſun ſurmounts the eaſtern hills behind Reggio, and riſes high enough to form an angle of 45 degrees on the water before the city, every object exiſting or moving at Reggio will be repeated 1000 fold upon this marine looking-glaſs; which, by its tremulous motion, is as it were cut into facets. Each image will paſs rapidly off in ſucceſſion as the day advances, and the ſtream carries down the wave on which it appeared. Thus the parts of this moving picture will vaniſh in the twinkling of an eye. Sometimes the air is at that moment ſo impregnated with vapours, and undiſturbed by winds, as to reflect objects in a kind of aerial ſcreen, riſing about 30 feet above the level of the ſea. In cloudy heavy weather, they are drawn on the ſurface of the water, bordered with fine priſmatical colours.

To the above account we ſhall add the following, given by M. Houel, whoſe judgment and veracity render his authority highly reſpectable. "In fine ſummer days, when the weather is calm, there riſes above the great current a vapour, which acquires a certain denſity, ſo as to form in the atmoſphere horizontal priſms, whoſe ſides are diſpoſed in ſuch a manner, that when they come to their proper degree of perfection, they reflect and repreſent ſucceſſively, for ſome time (like a moveable mirror), the objects on the coaſt or in the adjacent country. They exhibit by turns the city and ſuburbs of Meſſina, trees, animals, men, and mountains. They are certainly beautiful aerial moving pictures. They are ſometimes two or three priſms equally perfect; and they continue in this ſtate eight or ten minutes. After this, ſome ſhining inequalities are obſerved upon the ſurface of the priſm, which render confuſed to the eye the objects which has been before ſo accurately delineated, and the picture vaniſhes. The vapour forms other combinations, and is diſperſed in air. Different accounts have been given of this ſingular appearance; which for my part I attribute to a bitumen which iſſues from certain rocks at the bottom of the ſea, and which is often ſeen to cover a part of its ſurface in the canal of Meſſina. The ſubtle part of the this bitumen being attenuated, combined, and exhaled with the aqueous globules that are raiſed by the air, and formed into bodies of vapour, give to this condenſed vapour more conſiſtence; and contribute by their ſmooth and poliſhed particles, to the formation of a kind of aerial cryſtal, which receives the light, reflects it to the eye, and tranſmits to it all the luminous points which colour the objects exhibited in this phenomenon and render them viſible."

FATE, (*fatum*), denotes an inevitable neceſſity depending upon a ſuperior cauſe. The word is formed *a fando*, "from ſpeaking:" and primarily implies the ſame with *effatum*, viz. a word or decree pronounced by God; or a fixed ſentence whereby the Deity has preſcribed the order of things, and allotted to every perſon what ſhall befal him.

The Greeks call it ειμαρμενη, as it were a chain or neceſſary ſeries of things indiſſolubly linked together. It is alſo uſed to expreſs a certain unavoidable deſignation of things, by which all agents, both neceſſary and voluntary, are ſwayed and directed to their ends. See NECESSITY.

In this laſt ſenſe, fate is diſtinguiſhed into, 1. Aſtrological fate, ariſing from the influence and poſition of the heavenly bodies; which (it is ſuppoſed) gave laws both to the elements and mixed bodies, and to the wills of men. 2. Stoical fate, defined by Cicero an order or ſeries of cauſes, wherein, cauſe being linked to cauſe, each produces another, and thus all things flow from one prime cauſe. To this fate the Stoics ſubject even the gods.

Fate is divided by later authors into phyſical and divine. 1. Phyſical fate is an order and ſeries of natural cauſes appropriated to their effects. By this fate it is that fire warms, bodies communicate motion to each other, &c. and the effects of it are all the events and phenomena of nature. 2. Divine fate is what is more uſually called *Providence*. See PROVIDENCE.

FATES, in mythology. See PARCÆ.

FATHEMITES, FATEMITES, or FATHIMITES, the deſcendants of Mahomet by Fathema, or Fatima, his daughter. They never enjoyed the khalifat of Mecca or Bagdad, but reigned in Barbary and Egypt. See the hiſtory of theſe countries.

FATHER, a term of relation denoting a perſon who who had begot a child. See PARENT and CHILD.

By the laws of Romulus, a father had an unlimited power over his children. Amongſt the Lacedemonians, as we learn from Ariſtotle's politics, the father of three children was excuſed from the duty of mounting guard for the ſecurity of the city; and a father of four children, was exempted from every public burden, the Poppæan law, amongſt the Romans, granted many valuable privileges to the fathers of three children; amongſt which one was, that he ſhould be excuſed from civil offices, and that the mother ſhould have liberty in her father's life-time, to make a will, and manage her eſtate without the authority of tutors.

Natural FATHER, is he who has illegitimate children. See BASTARD; and LAW, N° clxi. 33. clxxxii. 3, 4.

Adoptive FATHER, is he who takes the children of ſome other, and acknowleges them as his own. See ADOPTION.

Putative FATHER, is he who is only the reputed or ſuppoſed father. Joſeph was putative father of our Saviour.

FATHER-*in-law*, is a perſon married to a woman who has children by a former huſband, &c. to which children he is ſaid to be a father-in-law.

FATHER is alſo uſed in theology for the firſt Perſon in the Trinity.

FATHER is alſo uſed in a figurative ſenſe on divers moral and ſpiritual occaſions. Thus, it is applied to the patriarchs; as we ſay Adam was the father of all mankind, Abraham the father of the faithful, &c.

FATHER, in church-hiſtory, is applied to ancient authors who have preſerved in their writings the traditions of the church. Thus St Chryſoſtom, St Baſil, &c. are called *Greek fathers*, and St Auguſtine and St Ambroſe *Latin Fathers*. No author who wrote later than the 12th century is dignified with the title of *Father*.

FATHER, is alſo a title of honour given to prelates and dignitaries of the church, to the ſuperiors of convents, to congregations of eccleſiaſtics, and to perſons venerable for their age or quality. Thus we ſay, the right reverend father in God, the father general of the Benedictines, the fathers of the council of Nice, father of his country, &c.

FATHERLASHER, in ichthyology. See COTTUS.

FATHOM, a long meaſure containing ſix feet, uſed chiefly at ſea for meaſuring the length of cables and cordage.

FATNESS. See CORPULENCY.—It is obſerved that for one fat perſon in France or Spain, there are an hundred in England and Holland. This is ſuppoſed to be from the uſe of new malt liquors, more than from the difference of climates or degrees of perſpiration. Indolence may cauſe fatneſs in ſome few conſtitutions; but, in general, thoſe who are diſpoſed to this habit will be fat in ſpite of every endeavour to the contrary, but that of deſtroying health.

FATUARII, in antiquity, were perſons who, appearing inſpired, foretold things to come. The word is formed of *Fatua*, wife of the god Faunus, who was ſuppoſed to inſpire women with the knowledge of futurity, as Faunus himſelf did the men.—Fatua had her name from *fari*, q. d. *vaticinari*, "to propheſy."

FAVISSÆ, in antiquity, were, according to Feſtus and Gellius, ciſterns to keep water in: but the faviſſæ in the Capitol at Rome were dry ciſterns or ſubterraneous cellars, where they laid up the old ſtatues, broken veſſels, and other things uſed in the temple. Theſe were much the ſame with what, in ſome of the modern churches are called the *archives* and *treaſury*.

FAUNA, a deity among the Romans. She was daughter of Picus, and was originally called *Marica*. Her marriage with Faunus procured her the name of *Fauna*, and her knowledge of futurity that of *Fatua* and *Fatidica*. It is ſaid that ſhe never ſaw a man after her marriage with Faunus, and that her uncommon chaſtity occaſioned her being ranked among the gods after death. She is the ſame, according to ſome, as *Bona Mater*.

FAUNALIA, in antiquity, Roman feaſts celebrated in honour of the god Faunus, who was the ſame among the Romans with the *Pan* of the Greeks.

The Faunalia were held on the day of the nones of December; i. e. on the fifth day of that month. The principal ſacrifice was a roe-buck; or rather, according to Horace, a kid, attended with libations of wine and burning of incenſe. It was properly a country feſtival being performed in the fields and villages with peculiar joy and devotion. Horace gives us a very gay deſcription thereof in the 18th ode of his third book:

> *Tener pleno cadit hædus anno:*
> *Larga nec deſunt Veneris ſodali*
> *Vina crateræ: vetus ara multo*
> *Fumat odore.*

Struvius in his Roman kalendar marks the feaſt of Faunus on the day of the ides of February, which is the 30th day of that month; and the Faunalia he places on the fifth of the ides of December, on the 9th of that month: and in chap. ix. he ſhows, that there really were two Faunalia; the one in February, mentioned by Ovid, Faſt. lib. vi. ver. 246, the other on the 9th of December, mentioned by Horace in the place juſt cited.

FAUNS, (Fauni), among the ancients, were a ſpecies of demi-gods inhabiting the foreſts; called alſo *Sylvans* (*Sylvani*), and little differing from the Satyrs. They delighted more particularly in vineyards; and they generally appear as attendants of Bacchus, in the repreſentations of Bacchanal feaſts and proceſſions. They were repreſented as half men, half goats, having the horns, ears, feet, and tail of a goat, a very flat noſe, and the reſt human. Though the Fauns were held for demi-gods, yet they were ſuppoſed to die after a long life. Arnobius ſhews that their father or chief, Faunus himſelf, only lived 120 years.

FAUNUS, (fab. hiſt.) a ſon of Picus, who reigned in Italy about 1300 years before the Auguſtan age. His bravery as well as wiſdom, having given riſe to the tradition that he was ſon of Mars. His great popularity, and his fondneſs for agriculture, made his ſubjects revere him as one of their country deities after death. He was repreſented with all the equipage of the ſatyrs, and was conſulted to give oracles.

FAVONIUS, among the Romans, the wind which blew directly from the weſt.

FAVORINUS, an ancient orator and philoſopher of Gaul, who flouriſhed under the emperor Adrian, and taught with high reputation both at Athens and Rome. Many works are attributed to him; among the reſt, a Greek miſcellaneous hiſtory often quoted by Diogenes Laertius.

FAUSTUS. See Fust.

FAWKES (Francis), an ingenious poet, had his ſchool-education at Leeds; from whence he was tranſplanted to Jeſus-college, Cambridge, where he took the degrees in arts. Entering early into holy orders, he ſettled himſelf at Bramham in Yorkſhire, near the elegant ſeat of that name (Mr Lane's), which he celebrated in verſe in 1745, in a 4to pamphlet anonymous. His firſt poetical publications were, Gawen Douglas's Deſcription of May and Winter moderniſed. Removing afterwards to the curacy of Croydon in Surry, he recommended himſelf to the notice of Archbiſhop Herring, then reſident there on account of his health, to whom beſides other pieces he addreſſed an Ode on his recovery in 1754, printed in Mr Dodſley's Collection. In conſequence, his Grace collated him in 1755 to the vicarage of Orpington with St Mary Gray in Kent; and Mr Fawkes lamented his patron's death in 1757 in a pathetic elegy ſtyled *Aurelius*, firſt printed with his Grace's Seven Sermons, in 1763. He married about the ſame time Miſs Purrier of Leeds. In April 1774, by the late Dr Plumtree's favour, he exchanged his vicarage for the rectory of Hayes. He was alſo one of the chaplains to the Princeſs Dowager of Wales. He publiſhed a volume of Poems by ſubſcription in 8vo, 1761; the Poetical Kalendar 1763; and Poetical Magazine 1764, in conjunction with Mr Woty; Partridge-ſhooting, an Eclogue, to the Honourable Cha. York, 1767, 4to; and a Family Bible, with notes, in 4to, a compilation. But his great ſtrength lay in tranſlation, in which, ſince Pope, few have equalled him. Witneſs his fragments of Menander (in his Poems); his Works of Anacreon, Sappho, Bion, Moſchus, and Muſæus, 12mo, 1760; his Idylliums of Theocritus, by ſubſcription, 8vo, 1767; and his Argonautics of Apollonius Rhodius, by ſubſcription alſo (a poſthumous publication, completed by the Reverend Mr Meen of Emanuel College, Cambridge), 8vo, 1780. He died Auguſt 26. 1777.

FAWN among ſportſmen, a buck or doe of the firſt year; or the young one of the buck's breed in its firſt year.

FE, fo, or *Fohi*, the name of the chief god of the Chineſe, whom they adore as the ſovereign of heaven. They repreſent him ſhining all in light, with his hands hid under his robes, to ſhow that his power does all things inviſibly. He has at his right hand the famous Confucius, and at his left Lanza or Lanca, chief of the ſecond ſect of their religion.

FEAL, a provincial term for ſod or turf.

Feal-Dikes, a cheap kind of fence common in Scotland; built with feal or ſod dug up by the ſpade from the ſurface of graſs-ground, conſiſting of the upper mould rendered tough and coherent by the matted roots of the graſs thickly interwoven with it. If only a very thin bit of the upper ſurface is pared off with a paring ſpade, the pieces are called *divots*. Theſe being of a firmer conſiſtence, are more durable when built into dike than feal, but much more expenſive alſo.

FEALTY, in law, an oath taken on the admittance of any tenant, to be true to the lord of whom he holds

Fear, Feaſt.

holds his land: by this oath the tenant holds in the freeſt manner, on account that all who have fee hold *per fidem et fiduciam*, that is, by fealty at the leaſt.

This fealty, at the firſt creation of it, bound the tenant to fidelity, the breach of which was the loſs of his fee. It has been divided into general and ſpecial: general, that which is to be performed by every ſubject to his prince; and ſpecial, required only of ſuch as, in reſpect of their fee are tied by oath to their lords. To all manner of tenures, except tenancy at will, and frank-almoign, fealty is incident, though it chiefly belongs to copyhold eſtates held in fee and for life. The form of this oath, by ſtat. 17 Edw. II. is to run as follows. "I A. B. will be to you my lord D. true and faithful, and bear to you faith for the lands and tenements which I hold of you; and I will truly do and perform the cuſtoms and ſervices that I ought to do to you. So help me God."

FEAR, one of the paſſions of the human mind: (ſee PASSION). It is defined, an apprehenſion of impending evil, attended with a deſire of avoiding it.

Fear in the extreme is called *fright* or *terror*. See FRIGHT.

FEAR, in ſcripture, is uſed in various ſenſes.

The *fear of God* is either filial or ſervile. The filial fear is a holy affection or gracious habit in the ſoul, whereby it is inclined to obey all God's commandments, and to hate and avoid evil. Slaviſh or ſervile fear is the conſequence of guilt; it is a judicial impreſſion from the ſad thoughts of the provoked majeſty of heaven; it is an alarm within that diſturbs the reſt of a ſinner. Though this fear be in wicked men, yet it often proves a preparative to faith and repentance.

Fear is likewiſe uſed for the *object* of fear. Thus it is ſaid, "the *fear* of Iſaac," to deſcribe the God whom Iſaac feared, (Gen. xxxi. 42.), and in Prov. i. 26. "I will mock you when your *fear* cometh;" that is, the calamity you feared. God ſays, that he will ſend his *fear* before his people; that is, a dread wrought by him, in order to terrify and deſtroy the inhabitants of Canaan.

FEAR *(Metus, Pavor,* or *Timor)*, was deified by the Pagans. Tullus Hoſtilius brought the worſhip of this deity to Rome. The Ephori of Sparta erected a temple to Fear, near their tribunal, to ſtrike an awe into thoſe who approached it. Fear was likewiſe worſhipped at Corinth. The poets did not forget this imaginary deity. Virgil places her in the entrance of hell, in company with diſeaſes, old age, &c. *Æn.* vi. 273. Ovid places her in the retinue of Tiſiphone one of the furies, *Met.* iv. 483.

FEAST, or FESTIVAL, in a religious ſenſe, is a ceremony of feaſting and thankſgiving. The word is formed of the Latin *feſtum*, which ſome derive *a feriari* "to keep holiday;" others from the Greek ἑστιαω "I feaſt or entertain," of ἑστια "hearth, fire."

Feaſts, and the ceremonies thereof, have made great part of the religion of almoſt all nations and ſects; witneſs thoſe of the Greeks, Romans, Hebrews, Chriſtians, and Mahometans.

The firſt feaſts among the Greeks were celebrated in ſolemn aſſemblies of the whole nation, on occaſion of their games, as the Olympic, the Pythian, the Iſthmian, and Næmean: in proceſs of time they had many others, the principal of which are enumerated in the courſe of this work.

Feaſt.

The Romans alſo had abundance of ſtated feaſts in honour of their deities and heroes; ſuch were the Saturnalia, Cerealia, Lupercalia, Liberalia, Neptunalia, Conſualia, Portumnalia, Vulcanalia, Palilia, Divalia, &c. See SATURNALIA, &c.

They had alſo feaſts inſtituted occaſionally; as Carmentalia, Quirinalia, Terminalia, Floralia, Compitalia, Lemuria, Vernalia, beſide other moveable and occaſional ones: as to give thanks to the gods for benefits received, to implore their aſſiſtance, or to appeaſe their wrath, &c. as the Paganalia, Feralia, Bacchanalia, Ambarvalia, Amburbalia, Suovetaurilia, and divers others, particularly denominated *feriæ*; as Sementinæ, Latinæ, &c. See each of theſe feaſts, and *feriæ* in its proper place. The feaſts were divided into days of ſacrifice, and days of banqueting and feaſting; days of games, and days of reſt or *feriæ*.

There being but little hiſtory written, or at leaſt publiſhed in thoſe days, one end of feaſts was to keep up the remembrance of paſt occurrences.

The principal feaſts of the Jews were the feaſts of trumpets, that of the expiation, of tabernacles, of the dedication, of the paſſover, of pentecoſt, and that of purification. See EXPIATION, &c.

The modern Jews have other feaſts marked in their kalendar of modern inſtitution. The Mahometans, beſides their weekly feaſt or ſabbath, which is kept on Friday, have two ſolemn feaſts, the firſt of which is called the *Feaſt of Victims*, and celebrated on the tenth day of the laſt month of their year; and the ſecond called *Bairam*: The Chineſe have two ſolemn feaſts in the year, in memory of Confucius, beſides others of leſs note on other days of the year.

Feaſts among us are either *immoveable* or *moveable*.

Immoveable Feaſts are thoſe conſtantly celebrated on the ſame day of the year; the principal of theſe are Chriſtmas-day or the Nativity, the Circumciſion, Epiphany, Candlemas, or the Purification; Lady-day, or the Annunciation, called alſo the *Incarnation* and *Conception*; All Saints, and All Souls; beſides the days of the ſeveral apoſtles, St Thomas, St Paul, &c. which with us are feaſts, though not *feriæ*. See each feaſt under its proper article.

Moveable Feaſts are thoſe which are not confined to the ſame day of the year. Of theſe the principal is Eaſter, which gives law to all the reſt, all of them following, and keeping their proper diſtances from it; ſuch are Palm-Sunday, Good-Friday, Aſh-Wedneſday, Sexageſima, Aſcenſion-day, Pentecoſt, and Trinity-Sunday. See EASTER, SEXAGESSIMA PENTECOST, TRINITY, &c.

The four feaſts which the Engliſh laws take ſpecial notice of are, the Annunciation of the bleſſed Virgin Mary or Lady-day, the 25th of March: the Nativity of St John the Baptiſt, held on the 24th of June; the Feaſt of St Michael the Archangel, on the 29th of September; and that of St Thomas the Apoſtle, on the 21ſt of December: on which quarterly days rent on leaſes is uſually reſerved to be paid (5 and 6 Edw. VI. cap. 3. 3 Jac. I. cap. 1. 12 Car. II. cap. 30.)

Beſide theſe feaſts which are *general*, and enjoined by the church, there are others *local* and *occaſional*, enjoined by the magiſtrate, or voluntarily ſet on foot by the people; ſuch are the days of thankſgiving for delivery from wars, plagues, &c. Such alſo are the vigils or wakes in commemoration of the dedications of particular churches. See VIGIL, &c.

The prodigious increaſe of the feaſt days in the Chriſtian church commenced towards the cloſe of the fourth century, and was occaſioned by the diſcovery that was then made of the remains of martyrs and other holy men, for the commemoration of whom they were eſtabliſhed. Theſe, inſtead of being ſet apart for pious exerciſes, were abuſed in indolence, voluptuouſneſs, and criminal practices. Many of them were inſtituted on a pagan model, and perverted to ſimilar purpoſes.

FEAST of Death, or *Feaſt of Souls*, a ſolemn religious ceremony in uſe among the ſavages of America; ſome of whom thus teſtify their reſpect for the deceaſed every eight years; and others, as the Hurons and Iroquois, every ten years.

The day of this ceremony is appointed by public order; and nothing is omitted, that it may be celebrated with the utmoſt pomp and magnificence. The neighbouring tribes are invited to be preſent, and to join in the ſolemnity. At this time all who have died ſince the laſt ſolemn occaſion are taken out of their graves: thoſe who have been interred at the greateſt diſtance from the villages are diligently ſought for, and brought to this great rendezvous of carcaſes.

It is not difficult to conceive the horror of this general diſinterment; but it cannot be deſcribed in a more lively manner than it is done by Lafitau, to whom we are indebted for the moſt authentic account of thoſe nations.

“ Without queſtion (ſays he), the opening of theſe tombs diſplays one of the moſt ſtriking ſcenes that can be conceived; this humbling portrait of human miſery, in ſo many images of death, wherein ſhe ſeems to take a pleaſure to paint herſelf in a thouſand various ſhapes of horror, in the ſeveral carcaſes, according to the degree in which corruption has prevailed over them, or the manner in which it has attacked them. Some appear dry and withered; others have a ſort of parchment upon their bones; ſome look as if they were baked and ſmoked, without any appearance of rottenneſs; ſome are juſt turning towards the point of putrefaction; whilſt others are all ſwarming with worms, and drowned in corruption. I know not which ought to ſtrike us moſt, the horror of ſo ſhocking a ſight, or the tender piety and affection of theſe poor people toward their departed friends; for nothing deſerves our admiration more than that eager diligence and attention with which they diſcharge this melancholy duty of their tenderneſs; gathering up carefully even the ſmalleſt bones, handling the carcaſes, diſguſtful as they are, with every thing loathſome, cleanſing them from the worms, and carrying them upon their ſhoulders through tireſome journeys of ſeveral days, without being diſcouraged from the offenſiveneſs of the ſmell, and without ſuffering any other emotions to ariſe than thoſe of regret, for having loſt perſons who were ſo dear to them in their lives, and ſo lamented in their death.

“ They bring them into their cottages, where they prepare a feaſt in honour of the dead; during which their great actions are celebrated, and all the tender intercourſes which took place between them and their friends are piouſly called to mind. The ſtrangers, who have come ſometimes many hundred miles to be preſent on the occaſion, join in the tender condolence; and the women, by frightful ſhrieks, demonſtrate that they are pierced with the ſharpeſt ſorrow. Then the dead bodies are carried from the cabins for the general reinterment. A great pit is dug in the ground, and thither, at a certain time, each perſon, attended by his family and friends, marches in ſolemn ſilence, bearing the dead body of a ſon, a father, or a brother. When they are all convened, the dead bodies, or the duſt of thoſe which were quite corrupted, are depoſited in the pit: then the torrent of grief breaks out anew. Whatever they poſſeſs moſt valuable is interred with the dead. The ſtrangers are not wanting in their generoſity, and confer thoſe preſents which they have brought along with them for the purpoſe. Then all preſent go down into the pit, and every one takes a little of the earth, which they afterwards preſerve with the moſt religious care. The bodies, ranged in order, are covered with entire new furs, and over theſe with bark, on which they throw ſtones, wood, and earth, then taking their laſt farewel, they return each to his own cabin.

“ We have mentioned, that in this ceremony the ſavages offer, as preſents to the dead, whatever they value moſt highly. This cuſtom which is univerſal among them, ariſes from a rude notion of the immortality of the ſoul. They believe this doctrine moſt firmly, and it is the principal tenet of their religion. When the ſoul is ſeparated from the body of their friends, they conceive that it ſtill continues to hover around it, and to require and take delight in the ſame things with which it formerly was pleaſed. After a certain time, however, it forſakes this dreary manſion, and departs far weſtward into the land of ſpirits. They have even gone ſo far as to make a diſtinction between the inhabitants of the other world; ſome, they imagine, particularly thoſe who in their lifetime have been fortunate in war, poſſeſs a high degree of happineſs, have a place for hunting and fiſhing, which never fails, and enjoy all ſenſual delights, without labouring hard in order to procure them. The ſouls of thoſe, on the contrary, who happen to be conquered or ſlain in war, are extremely miſerable after death.”

FEAST is alſo uſed for a banquet, or a ſumptuous meal, without any immediate view to religion.

The uſe of the word, in this ſenſe, ariſes hence; that a part of the ceremony of many of the ancient feſtivals, both thoſe of the heathens and agapæ of the Chriſtians, was good eating; though Mr Huet chooſes to derive the word from *feſtinare*, which is an ancient Latin verſion of Origen's Comment on Matthew, ſignifies “ to feaſt:” *Ut veniens illuc Jeſus feſtinet cum diſcipulis ſuis.*

Social or civil feaſts were alſo expreſſed by the words *convivium* and *compotatio*, or *concœnatio*. Cicero ſays, that in the Roman tongue, the word *convivium*, which means people aſſembled at table,” is more ſignificant than the Greek word word *compotatio* or *concœnatio*: the Roman, ſays he, expreſſes the conjunction of body and mind which ought to take place at an entertainment; the Greek denotes what relates to the body alone.

Feaſt.

As food is neceſſary to our exiſtence, it makes a bond of aſſociation among mankind. People at a feaſt, ſays one of the ancients, ſeem to form but one body, one ſoul. All nations, whether ſavage or civilized, have regarded the pleaſures of the table as the occaſion of the moſt agreeable ſociety. This ſpecies of enjoyment (abſtracting from its ſuſceptibility of abuſe) makes but one family of all that it brings together. It levels the diſtinctions introduced by policy or prejudice, and diſpoſes men to regard one another as brethren. It is here that people feel the equality eſtabliſhed by nature; here they forget the evils of life; they extinguiſh their hatred, and make their enmities ceaſe. For this reaſon Ariſtotle conſiders as a breach of the ſocial principle that cuſtom of the Egyptians of eating apart, and praiſes the convivial repaſts eſtabliſhed by Minos and Lycurgus.

The Perſians generally deliberated on buſineſs at table, but never determined or put their determinations in execution except in the morning before having eaten.

When the Germans, ſays Tacitus, wanted to reconcile enemies, to make alliances, to name chiefs, or to treat of war and peace; it was during the repaſt that they took counſel; a time in which the mind is moſt open to the impreſſions of ſimple truths, or moſt eaſily animated to great attempts. Theſe artleſs people during the conviviality of the feaſt ſpoke without diſguiſe. Next day they weighed the counſels of the former evening: they deliberated at a time when they were not diſpoſed to feign, and took their reſolution when they were leaſt liable to be deceived.

People of rank among the Rhodians, by a fundamental law of the ſtate, were obliged to dine daily with thoſe who had the management of affairs, in order to deliberate with them concerning ſuch things as were neceſſary or uſeful for the country; and on this account the principal miniſters of the kingdom were obliged to keep open table for all who could be of uſe to the ſtate.

Among the Romans, the place where they ſupped was generally the veſtibule, that a more retired part of the houſe might not encourage licentiouſneſs and diſorder. There were ſeveral laws that reſtricted their meals to theſe veſtibules.

When luxury reigned in Rome, they had ſuperb halls for their entertainments. Lucullus had many, each of which bore the name of ſome deity; and this name was a mark which indicated to the ſervants the expence of the entertainment. The expence of a ſupper in Lucullus's hall of Apollo amounted to 50,000 drachmas.

The hall in which Nero feaſted, by the circular motion of its walls and ceiling, imitated the revolutions of the heavens, and repreſented the different ſeaſons of the year, changing at every courſe, and ſhowering down flowers and perfumes on the gueſts.

The Romans did not, as we do, uſe but one table at their feaſts; they had generally two; the firſt was for the ſervices of animal food, which was afterwards removed, and another introduced with fruits; at this laſt they ſung and poured out their libations. The Greeks and eaſtern nations had the ſame cuſtom, and even the Jews in their ſolemn feaſts and at ſacrifices.

The Romans, in the time of Nero, had tables made of citron wood brought from Mauritania, they were varniſhed with purple and gold, and were raiſed on feet of carved ivory. It is ſaid that they were more precious than gold. Dion Caſſius affirms, that Seneca had 500 of theſe, which he made uſe of one after another; and Tertullian tells us that Cicero had but one. The Romans choſe the king of the feaſt by a throw of the dice.

We learn from Herodotus, that the ancients had neither cups nor bowls, but that they drank out of little horns tipt with ſilver or gold.

Under the reign of Charles V. of France, the cuſtom of placing the lights upon the table was not yet introduced. A number of domeſtics held the candles in their hands during the whole time of the repaſt.

The Greeks and Romans kept a domeſtic for the purpoſe of reading during their meals and feaſts. Sometimes the chief of the family himſelf performed the office of reader; and hiſtory informs us, that the Emperor Severus often read while his family ate. The time of reading was generally at ſupper; and gueſts were invited to a reading as they are now a-days to play cards.

The Greeks, in their flouriſhing times, did not profane, according to their own expreſſion, the *holineſs* of the table; but rather adorned it with ingenious and elegant converſation: they propoſed moral topics, of which Plutarch has preſerved a collection.

Ancient philoſophers remark, that heroes rarely aſſembled convivially without bringing affairs of conſequence into diſcourſe, or deliberating upon thoſe that regarded either preſent events or future contingencies.

The Scythians, while at meat, uſed to make the ſtrings of their bows reſound, leſt their warlike virtues might be enfeebled or loſt in this ſeaſon of pleaſure.

When Rome was corrupted with luxury, ſingers, dancers, muſicians, ſtage-players, and people that told pleaſant tales, were brought into the hall to amuſe the gueſts.

Plutarch informs us, that Cæſar, after his triumphs, treated the Roman people at 22,000 tables; and by calculation it would ſeem that there were at theſe tables upwards of 200,000 perſons.

At the end of the feaſt the Romans drunk out of a large cup as often as there were letters in the name of their miſtreſſes.

Feaſting ſeems to have been the chief delight of the Germans, Gauls, Britons, and all the other Celtic nations; in which they indulged themſelves to the utmoſt, as often as they had an opportunity. "Among theſe nations (ſays an author who had carefully ſtudied their manners) there is no public aſſembly, either for civil or religious purpoſes, duly held; no birth-day, marriage, or funeral properly celebrated; no treaty of peace or alliance rightly cemented, without a great feaſt." It was by frequent entertainments of this kind that the great men or chieftains gained the affections and rewarded the ſervices of their followers; and thoſe who made the greateſt feaſts were ſure to be moſt popular, and to have the greateſt retinue. Theſe feaſts (in which plenty was more regarded than elegance) laſted commonly ſeveral days, and the gueſts ſeldom retired until they had conſumed all the proviſions and exhauſted all the liquors. Athenæus deſcribes

Pelloutier Hiſt. Celt. l. 2, c. 12. p. 463.

ſcribes an entertainment that was given by Arcamnes, a very wealthy prince in Gaul, which continued a whole year without interruption, and at which all the people of Gaul, and even all ſtrangers who paſſed through that country, were made welcome. At theſe feaſts they ſometimes conſulted about the moſt important affairs of ſtate, and formed reſolutions relating to peace and war; imagining that men ſpoke their real ſentiments with the greateſt freedom, and were apt to form the boldeſt deſigns, when their ſpirits were exhilarated with the pleaſures of the table. The converſation at theſe entertainments very frequently turned on the great exploits which the gueſts themſelves or their anceſtors had performed in war; which ſometimes occaſioned quarrels and even bloodſhed. It was at a feaſt that the two illuſtrious Britiſh princes, Carbar and Oſcar, quarrelled about their own bravery and that of their anceſtors, and fell by mutual wounds, (*Oſſian*, vol. ii. p. 8, &c.)

As to the drink uſed at thoſe feaſts, particularly in Britain, it ſeems probable, that before the introduction of agriculture into the iſland, mead or honey diluted with water was the only ſtrong liquor known to its inhabitants, as it was to many other ancient nations in the ſame circumſtances. This continued to be a favourite beverage among the ancient Britons and their poſterity long after they had become acquainted with other liquors. The mead-maker was the eleventh perſon in dignity in the courts of the ancient princes of Wales, and took place of the phyſician. The following ancient law of that principality ſhows how much this liquor was eſteemed by the Britiſh princes.—“ There are three things in the court which muſt be communicated to the king before they are made known to any other perſon: 1. Every ſentence of the judge; 2. Every new ſong; and, 3. Every caſk of mead.” This was perhaps the liquor which is called by Oſſian the joy and ſtrength of ſhells, with which his heroes were ſo much delighted.—After the introduction of agriculture, ale or beer became the moſt general drink of all the Britiſh nations who practiſed that art, as it had long been of all the Celtic people on the continent. (See Ale.) If the Phœnicians or Greeks imported any wine into Britain, it was only in very ſmall quantities; that moſt generous liquor being very little known in that iſland before it was conquered by the Romans. The drinking veſſels of the Gauls, Britons, and other Celtic nations were, for the moſt part, made of the horns of oxen and other animals; but thoſe of the Caledonians conſiſted of large ſhells, which are ſtill uſed by ſome of their poſterity in the Highlands of Scotland.

The diſhes in which the meat was ſerved up were either of wood or earthen-ware, or a kind of baſkets made of oſiers. Theſe laſt were moſt uſed by the Britons, as they very much excelled in the art of making them both for their own uſe and for exportation. The gueſts ſat in a circle upon the ground, with a little hay, graſs, or the ſkin of ſome animal under them. A low table or ſtool was ſet before each perſon, with the portion of meat allotted to him upon it. In this diſtribution, they never neglected to ſet the largeſt and beſt pieces before thoſe who were moſt diſtinguiſhed for their rank, their exploits, or their riches. Every gueſt took the meat ſet before him in his hands, and tearing it with his teeth, fed upon it in the beſt manner he could. If any one found difficulty in ſeparating any part of his meat with his hands and teeth, he made uſe of a large knife, that lay in a particular place for the benefit of the whole company. Servants, or young boys and girls, the children of the family, ſtood behind the gueſts ready to help them to drink or any think they wanted.

As the ancient Britons greatly excelled and very much delighted in muſic, all their feaſts were accompanied with the joys of ſong, and the muſic of harps. In the words of Oſſian †, “ whenever the feaſt of ſhells is prepared, the ſongs of bards ariſe. The voice of ſprightly mirth is heard. The trembling harps of joy are ſtrung. They ſing the battles of heroes, or the heaving breaſts of love.” Some of the poems of that illuſtrious Britiſh bard appear to have been compoſed in order to be ſung by the hundred bards of Fingal * at the feaſt of Selma. Many of the ſongs of the bards which were ſung and played at the feaſt of the ancient Britons, were of a grave and ſolemn ſtrain, celebrating the brave actions of the gueſts, or of the heroes of other times; but theſe were ſometimes intermixed with more ſprightly and cheerful airs, to which the youth of both ſexes danced, for the entertainment of the company.

† Vol. II. p. 9. Vol. I. p. 37.

* *Ibid.* Vol. I. p. 87, 209.

It has been often obſerved by authors, that there is no nation in the world comes near the Engliſh in the magnificence of their feaſts. Thoſe made at their coronations, inſtalments, conſecrations, &c. tranſcend the belief of all foreigners; and yet it is doubted whether thoſe now in uſe are comparable to thoſe of their forefathers.

William the Conqueror, after he was peaceably ſettled on the throne of England, ſent agents into different countries, to collect the moſt admired and rare diſhes for his table; by which means, ſays John of Saliſbury, that iſland, which is naturally productive of plenty and variety of proviſions, was overflowed with every thing that could inflame a luxurious appetite. The ſame writer tells us, that he was preſent at an entertainment which laſted from three o'clock in the afternoon to midnight; at which delicacies were ſerved up, which had been brought from Conſtantinople, Babylon, Alexandria, Paleſtine, Tripoli, Syria, and Phenicia. Theſe delicacies, we may preſume, were very expenſive. Thomas Becket, if we may believe his hiſtorian Fitz-Stephen, gave L. 5, equivalent to L. 75 at preſent, for one diſh of eels. The ſumptuous entertainments which the kings of England, and of other countries, gave to their nobles and prelates, at the feſtivals of Chriſtmas, Eaſter, and Whitſuntide, in which they ſpent a great part of their revenues, contributed very much to diffuſe a taſte for profuſe and expenſive banqueting. It was natural for a proud and wealthy baron to imitate in his own caſtle the entertainments he had ſeen in the palace of his prince. Many of the clergy too, both ſeculars and regulars, being very rich, kept excellent tables. The monks of St Swithins, at Wincheſter, made a formal complaint to Henry II. againſt their abbot, for taking away three of the 13 diſhes they uſed to have every day at dinner. The monks of Canterbury were ſtill more luxurious: for they had at leaſt 17 diſhes every day, beſides a deſert; and theſe diſhes were dreſſed with ſpiceries and ſauces, which excited the appetite as well as pleaſed the taſte.

Great men had ſome kinds of proviſions at their tables that are not now to be found in Britain. When Henry II. entertained his own court, the great officers of his army, with all the kings and great men of Ireland, in Dublin, at the feaſt of Chriſtmas, A. D. 1171, the Iriſh princes and chieftains were quite aſtoniſhed at the profuſion and variety of proviſions which they beheld, and were with difficulty prevailed upon by Henry to eat the fleſh of cranes, a kind of food to which they had not been accuſtomed. In the remaining monuments of this period, we meet with the names of ſeveral diſhes, as dellegrout, maupigyrnum, karumpie, &c. the compoſition of which is now unknown.

The coronation-feaſt of Edward III. coſt L. 2835, 18 s. 2 d. equivalent to about L. 40,000 ſterling. At the inſtallation of Ralph, abbot of St Auguſtine, Canterbury, A. D. 1309, 6000 gueſts were entertained with a dinner, conſiſting of 3000 diſhes, which coſt L. 287 : 5 : 0, equal in efficacy to L. 4300 ſterling. "It would require a long treatiſe (ſays Matthew Paris) to deſcribe the aſtoniſhing ſplendour, magnificence, and feſtivity with which the nuptials of Richard earl of Cornwall, and Cincia daughter of Reimund earl of Provence, were celebrated at London, A. D. 1243. To give the reader ſome idea of it, in a few words, above 30,000 diſhes were ſerved up at the marriage dinner." The nuptials of Alexander III. of Scotland, and the Princeſs Margaret of England, were ſolemnized at York, A. D. 1251, with ſtill greater pomp and profuſion. "If I attempted (ſays the ſame hiſtorian) to diſplay all the grandeur of this ſolemnity,—the numbers of the noble and illuſtrious gueſts,—the richneſs and variety of the dreſſes,—the ſumptuouſneſs of the feaſts,—the multitudes of the minſtrils, mimicks, and others whoſe buſineſs it was to amuſe and divert the company, thoſe of my readers who were not preſent ſhould imagine that I was impoſing upon their credulity. The following particular will enable them to form a judgment of the whole. The archbiſhop of York made the king of England a preſent of 60 fat oxen, which made only one article of proviſion for the marriage-feaſt, and were all conſumed at that entertainment.

The marriage-feaſt of Henry IV. and his queen Jane of Navarre, conſiſted of ſix courſes; three of fleſh and fowl, and three of fiſh. All theſe courſes were accompanied and adorned with *ſuttleties*, as they were called. Theſe *ſuttleties* were figures in paſtry, of men, women, beaſts, birds, &c. placed on the table, to be admired, but not touched. Each figure had a label affixed to it; containing ſome wiſe or witty ſaying, ſuited to the occaſion of the feaſt, which was the reaſon they were called *ſuttleties*. The inſtallation feaſt of George Neville, archbiſhop of York and chancellor of England, exceeded all others in ſplendor and expence, and in the number and quality of the gueſts. The reader may form ſome idea of this enormous feaſt from the following liſt of proviſions prepared for it. In wheat, quarters, 300; in ale, tuns, 300; in wine, tuns, 100; in ipocraſſe, pipes, 1; in oxen; 104; in wild bulls, 6; in muttons, 1000; in veals, 304; in porkes, 304; in ſwanns, 400; in geeſe, 2000; in cappons, 1000; in pigs, 2000; in plovers, 400; in quailes, 1200; in fowls called rees, 2400; in peacocks, 104; in mallards and teals, 4000; in cranes, 204; in kidds, 204; in chickens, 2000; in pigeons, 2000; in connies, 4000, in bittors, 204; in heronſhaws, 400; in pheaſants, 200; in partridges, 500; in woodcocks, 400; in curliews, 100; in egrits, 1000; in ſtaggs, bucks, and roes, 500 and more; in paſties of veniſon, cold, 4000; in parted diſhes of jellies, 1000; in plain diſhes of jellies, 3000; in cold tarts, baked, 4000; in cold cuſtards, baked, 3000; in hot paſties of veniſon, 1500; in hot cuſtards, 2000; in pikes and breams, 301; in porpoiſes and ſeals, 12; ſpices, ſugared delicates, and wafers, plenty. No turkies are mentioned in this enormous bill of fare, becauſe they were not then known in England. Cranes, heronſhaws, porpoiſes, and ſeals, are ſeldom ſeen at modern entertainments.

One of the moſt expenſive ſingularities attending the royal feaſts in thoſe days conſiſted in what they called *intermeats*. Theſe were repreſentations of battles, ſieges, &c. introduced between the courſes, for the amuſement of the gueſts. The French excelled in exhibitions of this kind. At a dinner given by Charles V. of France, to the Emperor Charles IV. A. D. 1378, the following intermeat was exhibited: A ſhip with maſts, ſails, and rigging, was ſeen firſt: ſhe had for colours the arms of the city of Jeruſalem: Godfrey de Bouillon appeared upon deck, accompanied by ſeveral knights armed cap-a-pee: the ſhip advanced into the middle of the hall, without the machine which moved it being perceptible. Then the city of Jeruſalem appeared, with all its towers lined with Saracens. The ſhip approached the city; the Chriſtians landed, and began the aſſault; the beſieged made a good defence; ſeveral ſcaling-ladders were thrown down; but at length the city was taken. Intermeats at ordinary banquets conſiſted of certain delicate diſhes introduced between the courſes, and deſigned rather for gratifying the taſte than for ſatisfying hunger.

At thoſe feaſts, beſides the ordinary drinks, ale and cyder, there were great quantities of wines of various kinds. Of theſe laſt, the following lines of a poet who wrote in the fourth century, contain an ample enumeration.

> Ye ſhall have rumney and maleſpine,
> Both ypocraſſe and vernage wyne;
> Mountreſe and wyne of Greke,
> Both algrade and deſpice eke,
> Antioche and baſtarde,
> Pyment alſo, and garnarde,
> Wyne of Greke and Muſcadell,
> Both clare, pyment, and Rochell.

Some of theſe liquors, as ypocraſs, pyment, and claret, were compounded of wine, honey, and ſpices of different kinds, and in different proportions.

FEATHER, in phyſiology, a general name for the covering of birds: it being common to all the animals of this claſs to have their whole body, or at leaſt the greateſt part of it, covered with feathers or plumage. See ORNITHOLOGY, Sect. I. art. iv.

Feathers make a conſiderable article in commerce, particularly thoſe of the oſtrich, heron, ſwan, peacock, gooſe, &c. for plumes, ornaments of the head, filling of beds, writing pens, &c.

Geeſe are plucked in ſome parts of Great-Britain five times in the year; and in cold ſeaſons many of them die by this barbarous cuſtom, (ſee ANAS.)—Thoſe feathers that are brought from Somerſetſhire are eſteemed the beſt, and thoſe from Ireland the worſt.

Eider down * is imported from Denmark; the ducks that ſupply it being inhabitants of Hudſon's Bay, Greenland, Iceland, and Norway. The iſlands weſt of Scotland breed numbers of theſe birds, which turn out a profitable branch of trade to the poor inhabitants. Hudſon's Bay alſo furniſhes very fine feathers, ſuppoſed to be of the gooſe kind. The down of the ſwan is brought from Dantzic. The ſame place alſo produces great quantities of the feathers of the cock and hen. The London poulterers ſell a great quantity of the feathers of thoſe birds, and of ducks and turkies: thoſe of ducks being a weaker feather, are inferior to thoſe of the gooſe; and turkies feathers are the worſt of any. The beſt method of curing feathers is to lay them in a room, in an expoſure to the ſun; and when dried, to put them in bags, and beat them well with poles to get the dirt off.

* See the article *Down*.

FEBRIFUGE, an appellation given to ſuch medicines as mitigate or remove a fever.

FEBRUARY, in chronology, the ſecond month of Numa's year, and under the protection of the god Neptune. This month is not found in the kalendar of Romulus, but was added to the year by Numa. It had its name from *Februa, Februaca,* or *Februalis*, all names of Juno, who preſided over the purifications of women; and in this month the Lupercalia were held in honour of Juno, and women were purified by the prieſts of Pan Lyceus at that feſtival. See LUPERCALIA.

February, in a common year, conſiſts only of 28 days; but in the biſſextile year it has 29, on account of the intercalary day added that year.

FECIALES, or FOECIALES, an order of prieſts or officers, conſiſting of 20 perſons, among the ancient Romans, appointed to proclaim war, negociate peace, &c.

Feſtus derives the words from *ferio*, "I ſtrike;" as *ferire fœdus* ſignifies "to conclude a treaty:" and accordingly, inſtead of *feciales*, he would have it written *feriales*. Others derive it from *fœdus*, which was anciently written *fedus*; or from *fides*, "faith." Others from *facio, feci*, "I make," &c. becauſe they made war and peace. Voſſius chooſes to derive it from *fatu*, of the verb *fari*, "to ſpeak;" in which ſenſe the *feciales* ſhould be the ſame with *oratores*; which ſentiment is alſo confirmed by the authority of Varro, who ſays they were called indifferently *feciales* and *oratores*.

The feciales were a ſort of heralds, who, when the Romans had any diſputes with their neighbours, were ſent firſt to demand the thing pretended to be uſurped, or require ſatisfaction for the injury alledged to be done. If an anſwer was not returned by them that was ſatisfactory to the people and the ſenate, they were diſpatched again to declare war, and the like in treating of peace; the feciales being the only perſons appointed to negociate between the ſenate, &c. and the enemy.

Plutarch, in the life of Numa, and Halicarnaſſeus (*lib.* ii.), obſerves, that they were firſt inſtituted by that prince. The latter adds, that they were choſen out of the beſt families in Rome; that their office, which was reputed a ſort of ſacredotium, or prieſthood, only ended with their life; that their perſons were ſacred and inviolable, as thoſe of other prieſts; that they were even charged to ſee the republic did not declare war unjuſtly; that they were to receive the complaints and remonſtrances of nations who pretended to have been any way injured by the Romans; that if thoſe complaints were found juſt, they were to ſeize the criminals, and deliver them up to thoſe they had offended; that they were inveſted with the rights and privileges of ambaſſadors; that they concluded treaties of peace and alliance, and took care they were executed; and, laſtly, aboliſhed them, if they were found not to be equitable. Livy, lib. i. cap. 24. aſcribes their inſtitution to Ancus Martius, in the year of Rome 114.—Varro aſſures us, that in his time moſt of theſe functions of the feciales were ſet aſide; though Plutarch obſerves, that they had ſtill ſome authority in his time.

The feciales were crowned with *verbena*, "vervain," when they went to declare war. Their head was covered with a veil, over which the crown was applied. In this equipage they proceeded to the frontiers of the new enemy's country, and threw a bloody dart or javelin into the ground within the ſame. In Livy and other ancient authors we have the formula uſed in ſuch declarations.

FECUNDITY, the ſame with FERTILITY.

FEE, in law, ſignifies a complete feudal property. Hence, where the bare liferent of any feudal ſubject is meant to be conveyed to A, and the abſolute property to B, that meaning is expreſſed thus: "to A in liferent, and to B in fee." See LAW, Nº lxix. clxiv.

Fees are commonly divided into *abſolute*, otherwiſe called fees-ſimple; and *limited*, one ſpecies of which is uſually called fee-tail.

Blackſt. Comment.

I. Tenant in fee-ſimple (or, as he is frequently ſtyled, *tenant in fee*), is he that hath lands, tenements, or hereditaments, to hold to him and his heirs forever; generally, abſolutely, and ſimply; without mentioning what heirs, but refering that to his own pleaſure, or to the diſpoſition of the law. The true meaning of the word *fee (feodum)* is the ſame with that of *feud* or *fief* †, and in its original ſenſe it is taken in contradiſtinction to *allodium*; which latter the writers on this ſubject define to be every man's own land, which he poſſeſſeth merely in his own right, without owing any rent or ſervice to any ſuperior. This is property in its higheſt degree; and the owner thereof hath *abſolutum et directum dominium*, and therefore is ſaid to be ſeiſed thereof abſolutely *in dominico ſuo*, in his own demeſne. But *feodum*, or *fee*, is that which is held of ſome ſuperior, on condition of rendering him ſervice; in which ſuperior the ultimate property of the land reſides. And therefore Sir Henry Spelman defines a feud or fee to be, The right which the vaſſal or tenant hath in lands to uſe the ſame, and take the profits thereof to him, and his heirs, rendering to the lord his due ſervices; the mere allodial property of the ſoil always remaining in the lord. This allodial property no ſubject in Britain has; it being a received and now undeniable principle in the law, that all the lands are holden mediately or immediately of the king. The king therefore only hath *abſolutum et directum dominium*; but all ſubjects lands are in the nature of *feodum* or *fee*, whether derived to them by deſcent from their anceſtors, or purchaſed for a valuable conſideration: for they cannot

† See *Foedal Syſtem*.

not come to any man by either of thoſe ways, unleſs accompanied with thoſe feodal clogs which were laid upon the firſt feudatory when it was originally granted. A ſubject therefore hath only the uſufruct, and not the abſolute property, of the ſoil; or, as Sir Edward Coke expreſſes it, he hath *dominium utile*, but not *dominium directum*. And hence it is, that, in the moſt ſolemn acts of law, we expreſs the ſtrongeſt and higheſt eſtate that any ſubject can have by theſe words, "he is ſeiſed thereof *in his demeſne*, as of fee." It is a man's demeſne, *dominium*, or property, ſince it belongs to him and his heirs for ever: yet this *dominium*, property, or demenſe, is ſtrictly not abſolute or allodial, but qualified or feodal; it is in his demeſne, *as of fee*; that is, it is not purely and ſimply his own, ſince it is held of a ſuperior lord, in whom the ultimate property reſides.

This is the primary ſenſe and acceptation of the word *fee*. But (as Sir Martin Wright very juſtly obſerves) the doctrine, "that all lands are *holden*," having been for ſo many ages a fixed and undeniable axiom, the Engliſh lawyers do very rarely (of late years eſpecially) uſe the word *fee* in this its primary original ſenſe, in contradiſtinction to *allodium* or abſolute property, with which they have no concern; but generally uſe it to expreſs the continuance or quantity of eſtate. A *fee* therefore, in general, ſignifies an eſtate of inheritance; being the higheſt and moſt extenſive intereſt that a man can have in a feud: and when the term is uſed ſimply, without any other adjunct, or has the adjunct of *ſimple* annexed to it (as, a fee, or a fee-ſimple), it is uſed in contradiſtinction to a fee-conditional at the common law, or a fee-tail by the ſtatute; importing an abſolute inheritance, clear of any condition, limitation, or reſtrictions to particular heirs, but deſcendible to the heirs-general, whether male or female, lineal or collateral. And in no other ſenſe than this is the king ſaid to be ſeiſed in fee, he being the feudatory of no man.

Taking therefore *fee* in this its ſecondary ſenſe, as a ſtate of inheritance, it is applicable to, and may be had in, any kind of hereditaments either corporeal or incorporeal. But there is this diſtinction between the two ſpecies of hereditaments; that of a corporeal inheritance a man ſhall be ſaid to be ſeiſed *in his demeſne, as of fee*; of an incorporeal one he ſhall only be ſaid to be ſeiſed *as of fee*, and not *in his demeſne*. For as incorporeal hereditaments are in their nature collateral to, and iſſue out of, lands and houſes, their owner hath no property, *dominium*, or demeſne, in the *thing* itſelf, but hath only ſomething derived out of it; reſembling the *ſervitutes*, or ſervices, of the civil law. The *dominium*, or property, is frequently in one man, while the appendage or ſervice is in another. This Gaius may be ſeiſed *as of fee*, of a way going over the land, of which Titius is ſeiſed *in his demeſne as of fee*.

The fee ſimple or inheritance of lands and tenements is generally veſted and reſides in ſome perſon or other; though divers inferior eſtates may be carved out of it. As if one grants a leaſe for 21 years, or for one or two lives, the fee-ſimple remains veſted in him and his heirs; and after the determination of thoſe years or lives, the land reverts to the granter or his heirs, who ſhall hold it again in fee-ſimple. Yet ſometimes the fee may be in *abeyance*, that is (as the word ſignifies) in expectation, remembrance, and contemplation in law; there being no perſon *in eſſe*, in whom it can veſt and abide, though the law conſiders it as always potentially exiſting, and ready to veſt whenever a proper owner appears. Thus, in a grant to John for life, and afterwards to the heirs of Richard, the inheritance is plainly neither granted to John nor Richard, nor can it veſt in the heirs of Richard till his death, *nam nemo eſt hæres viventis*: it remains therefore in waiting, or abeyance, during the life of Richard. This is likewiſe always the caſe of a parſon of a church, who hath only an eſtate therein for the term of his life: and the inheritance remains in abeyance. And not only the fee, but the freehold alſo, may be in abeyance; as, when a parſon dies the freehold of his glebe is in abeyance until a ſucceſſor be named, and then it veſts in the ſucceſſor.

The word *heirs* is neceſſary in the grant or donation in order to make a fee or inheritance. For if land be given to a man for ever, or to him and his aſſigns for ever, this veſts in him but an eſtate for life. This very great nicety about the inſertion of the word *heirs* in all feoffments and grants, in order to veſt a fee, is plainly a relic of the feodal ſtrictneſs: by which it was required, that the form of the donation ſhould be punctually purſued; or that, as Craig expreſſes it in the words of Baldus, *donationes ſint ſtricti juris, ne quis plus donaſſe præſumatur quam in donatione expreſſerit*. And therefore as the perſonal abilities of the donee were originally ſuppoſed to be the only inducements to the gift, the donee's eſtate in the land extended only to his own perſon, and ſubſiſted no longer than his life; unleſs the donor, by an expreſs proviſion in the grant, gave it a longer continuance, and extended it alſo to his heirs. But this rule is now ſoftened by many exceptions.

For, 1. It does not tend to deviſes by will; in which, as they were introduced at the time when the feodal rigour was apace wearing out, a more liberal conſtruction is allowed: and therefore by a deviſe to a man for ever, or to one and his aſſigns for ever, or to one in fee-ſimple, the deviſee hath an eſtate of inheritance, for the intention of the deviſor is ſufficiently plain from the words of perpetuity annexed, though he hath omitted the legal words of inheritance. But if the deviſe to be a man and his aſſigns, without annexing words of perpetuity, there the deviſee ſhall take only an eſtate for life; for it does not appear that the deviſor intended any more. 2. Neither does this rule extend to fines or recoveries, conſidered as a ſpecies of conveyance; for thereby an eſtate in fee paſſes by act and operation of law without the word *heirs*: as it does alſo, for particular reaſons, by certain other methods of conveyance, which have relation to a former grant or eſtate, wherein the word *heirs* was expreſſed, 3. In creations of nobility by writ, the peer ſo created hath an inheritance in his title, without expreſſing the word *heirs*; for they are implied in the creation, unleſs it be otherwiſe ſpecially provided: but in creations by patent, which are *ſtricti juris*, the word *heirs* muſt be inſerted, otherwiſe there is no inheritance. 4. In grants of lands to ſole corporations and their ſucceſſors, the word *ſucceſſors* ſupplies the place of *heirs*; for as heirs take from the anceſtor, ſo doth the ſucceſſor from the predeceſſor. Nay, in a grant to a biſhop, or other ſole ſpiritual corporation, in *frankalmoign*, the word *frankalmoign* ſupplies the place of *ſucceſſors* (as the word *ſucceſſors* ſupplies the place of *heirs) ex vi termini*; and in all theſe caſes a fee-ſimple veſts in ſuch ſole corporation. But, in a grant of lands to a corporation aggregate, the word *ſucceſſors* is not neceſſary, though uſually inſerted: for, albeit ſuch ſimple grant be ſtrictly only an eſtate for life, yet as that corporation never dies, ſuch eſtate for life is perpetual, or equivalent to a fee-ſimple, and therefore the law allows it to be one. Laſtly, in the caſe of the king, a fee-ſimple will veſt in him, without the word *heirs* or *ſucceſſors* in the grant; partly from prerogative royal, and partly from a reaſon ſimilar to the laſt, becauſe the king, in judgment of law, never dies. But the general rule is, that the word *heirs* is neceſſary to create an eſtate of inheritance.

II. We are next to conſider limited fees, or ſuch eſtates of inheritance as are clogged and confined with conditions or qualifications of any ſort. And theſe we may divide into two ſorts: 1. *Qualified*, or *baſe* fees; and, 2, Fees *conditional*, ſo called at the common law and afterwards fees-*tail*, in conſequence of the ſtatute *de donis*.

1. A BASE or qualified fee, is ſuch a one as has a qualification ſubjoined thereto, and which muſt be determined whenever the qualification annexed to it is at an end. As, in the caſe of a grant to A and his heirs, tenants in the manor of Dale: in this inſtance, whenever the heirs of A ceaſe to be tenants of that manor, the grant is entirely defeated. So, when Henry VI. granted to John Talbot, lord of the manor of Kingſton-Liſle in Berks, that he and his heirs, lords of the ſaid manor, ſhould be peers of the realm, by the title of *barons of Liſle*; here John Talbot had a baſe or qualified fee in that dignity; and the inſtant he or his heirs quitted the ſeigniory of this manor, the dignity was at an end. This eſtate is a fee, becauſe by poſſibility it may endure for ever in a man and his heirs; yet as that duration depends upon the concurrence of collateral circumſtances, which qualify and debaſe the purity of the donation, it is therefore a qualified or baſe fee.

2. As to fees-*conditional*, or fees-*tail*, ſee the article TAIL.

FEE alſo ſignifies a certain allowance to phyſicians, barriſters, attornies, and other officers, as a reward for their pains and labour.

If a perſon refuſe to pay an officer his due fees, the court will grant an attachment againſt him, to be committed till the fees are paid; and an attorney may bring an action of the caſe for his fees againſt the client that retained him in his cauſe.

FEE alſo denotes a ſettled perquiſite of public officers, payable by thoſe who employ them.

The fees due to the officers of the cuſtom-houſe, are expreſsly mentioned in a ſchedule, or table, which is hung up in public view in the ſaid office, and in all other places where the ſaid fees are to be paid or received. And if any officer ſhall offend, by acting contrary to the regulations therein contained, he ſhall forfeit his office and place, and be for ever after incapable of any office in the cuſtom-houſe.

The other public offices have likewiſe their ſettled fees, for the ſeveral branches of buſineſs tranſacted in them.

FEE-*Farm*, a kind of tenure without homage, fealty, or other ſervice, except that mentioned in the feoffment; which is uſually the full rent, or at leaſt a fourth part of it.

The nature of this tenure is, that if the rent be behind, and unpaid for two years, then the feoffor and his heirs may have an action for the recovery of the lands.

FEELERS, in natural hiſtory, a name uſed by ſome for the horns of INSECTS.

FEELING, one of the five external ſenſes, by which we obtain the ideas of ſolid, hard, ſoft, rough, hot, cold, wet, dry, and other tangible qualities. See ANATOMY, nº 138.

FEET. See FOOT.

Feet-Bearer, the name of an officer in the courts of the ancient Anglo-Saxon and Welch kings. He was a young gentleman whoſe duty it was to ſit on the floor, with his back towards the fire, and hold the kings feet in his boſom all the time he ſat at table, to keep them warm and comfortable †: A piece of ſtate and luxury unknown in modern times.

† *Leges Walliæ*, p. 58.

FEINT, in fencing, a ſhow of making a thruſt at one part, in order to deceive the enemy, that you may really ſtrike him in another.

A ſimple feint is a mere motion of the wriſt, without ſtirring the foot.

FELAPTON, in logic, one of the ſix firſt modes of the third figure of ſyllogiſms; whereof the firſt propoſition is an univerſal negative, the ſecond an univerſal affirmative, and the third a particular negative.

FELIBIEN (Andre), was born at Chartres in 1619, and went ſecretary under the marquis de Fontenay Mareuil ambaſſador to the court of Rome in 1647. On his return, M. Colbert procured him the places of hiſtoriographer to the king, ſuperintendant of his buildings, and of arts and manufactures in France. He became afterwards deputy comptroller-general of the bridges and dykes in that kingdom; and died in 1695. He wrote ſeveral pieces relating to the fine arts; the principal of which is his "Dialogues on the lives and works of the moſt eminent painters."

FELICITAS, (FELICITY, or *Happineſs*), was deified by the ancient Pagans. Lucullus built a temple to her. She had another erected by Lepidus. The Greeks paid divine worſhip to *Maccaria*, daughter of Hercules, the ſame with *Felicitas*. This deity is often pictured upon medals, and generally with a Cornucopia in one hand and a Caduceus in the other. The inſcriptions are, *Felicitas Temporum*, *Felicitas Auguſti*, *Felicitas Publica*.

FELIS, in zoology, a genus of quadrupeds belonging to the order of feræ, the characters of which are theſe: The fore-teeth are equal; the molares or grinders have three points; the tongue is furniſhed with rough ſharp prickles, and pointing backwards; and the claws are ſheathed and retractile. This genus comprehends twenty-one ſpecies, *viz.*

See Plates CXCI. and CXCII.

Lion.

I. The *Leo*, or lion. The largeſt lions are from eight to nine feet in length, and from four to ſix feet high: thoſe of a ſmaller ſize are generally about 5½ feet long, and about 3½ high. His head is very thick, and his face is beſet on all ſides with long buſhy yellowiſh hair; this ſhaggy hair extends from the top of the head to below the ſhoulders, and hangs down to his knees: the belly and breaſt are likewiſe covered with long hair. The reſt of the body is covered with very ſhort hair, excepting a buſh at the point of the tail. The ears are roundiſh, ſhort, and almoſt entirely concealed under the hair of his front. The ſhaggineſs of the fore-part of his body makes the hinder part have a naked appearance. The tail is long and very ſtrong; the legs are thick and fleſhy; and the feet are ſhort; the length of the claws is about an inch and a quarter, are of a whitiſh colour, very crooked, and can be extended or retracted into the membranous ſheath at pleaſure: their points are ſeldom blunted, as they are never extended but when he ſeizes his prey.

The female, or lioneſs, has no mane, or long hair about her head or ſhoulders; in her we ſee diſtinctly the whole face, head, ears, neck, ſhoulders, breaſt, &c. all theſe parts being in ſome meaſure concealed under the long hair of the male, give the female a very different appearance; beſides, ſhe is conſiderably leſs than the male. The hair of both male and female is of a yellowiſh colour, and whitiſh on the ſides and belly.

In warm countries, quadrupeds in general are larger and ſtronger than in the cold or temperate climates. They are likewiſe more fierce and hardy; all their natural qualities ſeem to correſpond with the ardour of the climate. The lions nouriſhed under the ſcorching ſun of Africa or the Indies, are the moſt ſtrong, fierce, and terrible. Thoſe of mount Atlas, whoſe top is ſometimes covered with ſnow, are neither ſo ſtrong nor ſo ferocious as thoſe of Biledulgerid or Zaara, whoſe plains are covered with burning ſand. It is in theſe hot and barren deſarts, that the lion is the dread of travellers, and the ſcourge of the neighbouring provinces. But it is a happy circumſtance that the ſpecies is not very numerous: they even appear to diminiſh daily. The Romans, ſays Mr Shaw, brought many more lions out of Libya for their public ſhows, than are now to be found in that country. It is likewiſe remarked, that the lions in Turkey, Perſia, and the Indies, are leſs numerous than formerly. As this formidable and courageous animal makes a prey of moſt other animals, and is himſelf a prey to none, this diminution in the number of the ſpecies can be owing to nothing but an increaſe of the number of mankind: for it muſt be acknowledged, that the ſtrength of this kind of animals is not a match for the dexterity and addreſs of a negro or Hottentot, who will often dare to attack him face to face, and with very ſlight weapons.

The ingenuity of mankind augments with their number; that of other animals continues always the ſame. All the noxious animals, as the lion, are reduced to a ſmall number, not only becauſe mankind are become more numerous, but likewiſe becauſe they have become more ingenious, and have invented weapons which nothing can reſiſt. This ſuperiority in the numbers and induſtry of mankind, at the ſame time that it has broke the vigour of the lion, ſeems likewiſe to have enervated his courage. This quality, though natural, is exalted or lowered according to the good or bad ſucceſs with which any animal has been accuſtomed to employ his force. In the vaſt deſarts of Zaara; in thoſe which ſeem to ſeparate two very different races of men, the Negroes and Moors, between Senegal and the boundaries of Mauritania; in thoſe uninhabited regions above the country of the Hottentots; and in general, all the meridional parts of Africa and Aſia, where mankind have diſdained to dwell, lions are ſtill as numerous and as ferocious as ever. Accuſtomed to meaſure their ſtrength by that of all other animals which they encounter, the habit of conquering renders them haughty and intrepid. Having never experienced the ſtrength of man, or the power of his arms, inſtead of diſcovering any ſigns of fear, they diſdain and ſet him at defiance. Wounds irritate, but do not terrify them: they are not even diſconcerted at the ſight of numbers. A ſingle lion of the deſart has been known to attack a whole caravan; and if, after a violent and obſtinate engagement, he found himſelf weakened, he retreats fighting, always keeping his face to the enemy. On the other hand, the lions which live near the villages or huts of the Indians or Africans, being acquainted with man and the force of his arms, are ſo daſtardly as to fly and leave their prey at the ſight of women or children.

This ſoftening in the temper and diſpoſition of the lion, ſhows that he is capable of culture, and ſuſceptible, at leaſt to a certain degree, of the impreſſions that he receives: accordingly, hiſtory informs us of lions yoked in triumphal chariots, trained to war, or the chace; and, that faithful to their maſters, they never employed their ſtrength or courage but againſt their enemies. It is certain, that a lion taken young, and brought up among domeſtic animals, will eaſily be accuſtomed to live and ſport with them; that he is mild and careſſing to his maſter, eſpecially when he is young; and that, if his natural ferocity ſometimes breaks out, it is rarely turned againſt thoſe who have been kind to him. But, as his paſſions are impetuous and vehement, it is not to be expected that the impreſſions of education will at all times be ſufficient to balance them: for this reaſon it is dangerous to let him ſuffer hunger long, or to vex him by ill-timed teazings: bad treatment not only irritates him, but he remembers it long, and meditates revenge. On the other hand, he is exceedingly grateful, and ſeldom forgets benefits received. He has beeen often obſerved to diſdain weak or inſignificant enemies, to deſpiſe their inſults, and to pardon their offenſive liberties. When led into captivity, he will diſcover ſymptoms of uneaſineſs, without anger or peeviſhneſs: on the contrary his natural temper ſoftens, he obeys his maſter, careſſes the hand that gives him food, and ſometimes gives life to ſuch animals as are thrown to him alive for prey: by this act of generoſity he ſeems to conſider himſelf as for ever bound to protect them; he lives peaceably with them; allows them a part, and ſometimes the whole, of his food; and will rather ſubmit to the pangs of hunger, than fill his ſtomach with the fruit of his beneficence. We may likewiſe obſerve, that the lion is not a cruel animal: he kills rather from neceſſity than choice, never deſtroying more than he eats; and whenever his appetite is ſatisfied, he is mild and peaceable. For his ordinary ſubſiſtence, he requires about 15 pounds of raw fleſh each day.

The aſpect of the lion correſponds with the noble and generous qualities of his mind. His figure is reſpectable; his looks are determined; his gait is ſtately, and his voice tremendous. In a word, the body of the lion appears to be the beſt model of ſtrength joined to agility. The force of his muſcles is expreſſed by his prodigious leaps and bounds, often 20 feet at once; by the briſk motion of his tail, a ſingle ſweep of which is ſufficient to throw a man to the ground; by the eaſe with which he moves the ſkin of his face, and particularly of his forehead; and, laſtly, by the faculty of erecting and agitating the hair of his mane when irritated.

Lions are very ardent in their amours: when the female is in ſeaſon, ſhe is often followed by eight or ten males, who roar inceſſantly, and enter into furious engagements, till one of them completely overcomes the reſt, takes peaceable poſſeſſion of the female, and carries her off to ſome ſecret receſs. The lioneſs brings forth her young in the ſpring, and produces but once every year.

All the paſſions of the lion, the ſoft paſſion of love not excepted, are exceſſive; the love of offspring is extreme: the lioneſs is naturally weaker, leſs bold, and more gentle than the lion; but ſhe becomes perfectly rapacious and terrible when ſhe has young. Then ſhe exhibits more courage than the male; ſhe regards no danger; ſhe attacks indifferently men and all other animals, kills them, and carries them to her young ones, whom ſhe thus early inſtructs to ſuck their blood and tear their fleſh. She generally brings forth in the moſt ſecret and inacceſſible places; and, when afraid of a diſcovery, ſhe endeavours to conceal the traces of her feet, by returning frequently on her ſteps, or rather by effacing them with her tail; and, when the danger is great, ſhe carries off her young, and conceals them ſomewhere elſe. But, when an actual attempt is made to deprive her of her young, ſhe becomes perfectly furious, and defends them till ſhe be torn to pieces.

The lion ſeldom goes abroad in the middle of the day; but ſallies forth in the evening and night in queſt of prey. He is afraid of fire, and ſeldom or never approaches the artificial fires made by the ſhepherds for the protection of their flocks; he does not trace other animals by the ſcent, but is obliged to truſt to his eyes. Many hiſtorians have even miſrepreſented him as incapable of finding out his prey; but that he is obliged to the jackal, an animal of exquiſite ſcent, in order to provide for him, and that this animal either accompanies or goes before him for this purpoſe. The jackal is a native of Arabia, Libya, &c. and, like the lion, lives upon prey: perhaps ſometimes he follows the lion, but it is with a view to pick up what he leaves behind, not to provide for him; for, being a ſmall and feeble animal, he ought rather to fly from than to ſerve the lion.

The lion, when hungry, will attack any animal that preſents itſelf; but he is ſo very formidable that all endeavour to avoid his rencounter; this circumſtance often obliges him to conceal himſelf, and lie in wait till ſome animal chances to paſs. He lies ſquat on his belly in a ticket; from which he ſprings with ſuch force and velocity, that he often ſeizes them at the firſt bound. He endures hunger longer than thirſt; he ſeldom paſſes water without drinking, which he does by lapping like a dog. In burning deſarts, where rivers and fountains are denied, they live in a perpetual fever, a ſort of madneſs fatal to every animal they meet with. The author of the *Oeconomy of Nature* gives a wonderful proof of the inſtinct of theſe animals in thoſe unwatered tracts. There the pelican makes her neſt; and in order to cool her young ones, and accuſtom them to an element they muſt afterwards be converſant in, brings from afar, in their great gular pouch, ſufficient water to fill the neſt: the lion, and other wild beaſts, approach and quench their thirſt yet never injure the unfledged birds, as if conſcious that their deſtruction would immediately put a ſtop to thoſe grateful ſupplies.

The roaring of the lion, which is ſtrong and loud, is his ordinary voice; but when he is irritated, his cry is ſhorter, repeated more ſuddenly, and is ſtill more terrible than the roaring: beſides, he beats his ſides with his tail, ſtamps with his feet, erects and agitates the hair of his head and mane, moves the ſkin of his face, ſhows his angry teeth, and lolls out his tongue.

The roaring of the lion, according to Mr Sparman, “ conſiſts in a hoarſe inarticulate ſound, which at the ſame time ſeems to have a hollowneſs in it ſomething like that proceeding from a ſpeaking trumpet. The ſound is between that of a German *u* and an *o*, being drawn to a great length, and appearing as if it came from out of the earth; at the ſame time that, after liſtening with the greateſt attention, I could not exactly hear from what quarter it came. The ſound of the lion's voice does not bear the leaſt reſemblance to thunder, as M. de Buffon, tom. ix. p. 22. from the Voyage of Boullaye le Gouz, affirms it does. In fact, it appeared to me to be neither peculiarly piercing nor tremendous; yet, from its ſlow prolonged note, joined with nocturnal darkneſs, and the terrible idea one is apt to form to one's ſelf of this animal, it made one ſhudder, even in ſuch places as I had an opportunity of hearing it with more ſatisfaction, and without having the leaſt occaſion for fear. We could plainly perceive by our cattle when the lions, whether they roared or not, were reconnoitering us at a ſmall diſtance. For in that caſe the hounds did not dare to bark in the leaſt, but crept quite cloſe to the Hottentots; and our oxen and horſes ſighed deeply, frequently hanging back, and pulling ſlowly with all their might at the ſtrong ſtraps with which they were tied up to the waggon. They likewiſe laid themſelves down upon the ground and ſtood up alternately, appearing as if they did not know what to do with themſelves: or rather juſt as if they were in the agonies of death. It is, indeed, a wonderful circumſtance (continues our author), that the brute creation ſhould have been taught merely by nature to be in dread of the lion; for our horſes and oxen were all from places where I am certain they could have no knowledge of this dreadful adverſary of theirs: ſo that in this we muſt admire the bounty of Providence, which, while it has ſent ſuch a tyrant as the lion amongſt the animal creation, has likewiſe taught them to diſcern and diſtinguiſh it with trembling and horror.”

The gait of the lion is ſtately, grave, and ſlow, tho' always in an oblique direction. His movements are not equal or meaſured, but conſiſts of leaps and bounds; which prevent him from ſtopping ſuddenly, and makes him often overleap his mark. When he leaps upon his prey, he makes a bound of 12 or 15 feet, falls above it, ſeizes it with his fore-feet, tears the fleſh with his claws, and then devours it with his teeth. If he chances to miſs his leap, he will not, as the Hottentots unanimouſly aſſured Mr Sparman, follow his prey any farther, but as though he were aſhamed, turning round towards the place where he lay in ambuſh, ſlowly, and ſtep by ſtep, as it were, meaſures the exact length between the two points, in order to find how much too ſhort of, or beyond, the mark he had taken his leap.

One would ſuppoſe that the roaring of the lion would prove ſerviceable to the other animals as being a warning for them to betake themſelves to flight; but as when he roars, according to all report, he puts his mouth to the ground, ſo that the ſound is diffuſed equally all over the place, without, as we have already mentioned, its being poſſible to hear from what quarter it comes, the animals are intimidated and ſcared to ſuch a degree, as to fly about backwards and forwards in the dark to every ſide; in conſequence of which, they often chance to run on to the very ſpot from whence the ſound actually proceeds, and which they meant moſt to avoid.

Dr Sparman, in his account of the lion, detracts conſiderably from the character of courage and generoſity generally aſcribed to that animal. "It is not in magnanimity (ſays he), as many will have it to be, but in an inſidious and cowardly diſpoſition, blended with a certain degree of pride, that the general character of the lion conſiſts; though hunger muſt naturally have the effect of now and then inſpiring ſo ſtrong and nimble an animal with uncommon intrepidity and courage. Moreover, being accuſtomed always itſelf to kill its own food, and that with the greateſt eaſe, as meeting with no reſiſtance, and even frequently to devour it reeking and weltering in its blood, it cannot but be eaſily provoked, and acquire a greater turn for cruelty than for generoſity: but, on the other hand, not being accuſtomed to meet with any reſiſtance, it is no wonder that, when it does, it ſhould ſometimes be faint-hearted and creſt fallen. A yeoman, a man of veracity (Jacob Kok, of Zeekoe-river), related to me an adventure he had in theſe words:—One day walking over his lands with his loaded gun, he unexpectedly met with a lion. Being an excellent ſhot, he thought himſelf pretty certain, in the poſition he was in, of killing it, and therefore fired his piece. Unfortunately he did not recollect, that the charge had been in it for ſome time, and conſequently was damp; ſo that his piece hung fire, and the ball falling ſhort, entered the ground cloſe to the lion. In conſequence of this he was ſeized with a panic, and took directly to his feet; but being ſoon out of breath, and cloſely purſued by the lion, he jumped up on a little heap of ſtones, and there made a ſtand, preſenting the butt end of his gun to his adverſary, fully reſolved to defend his life as well as he could to the utmoſt. My friend did not take upon him to determine, whether this poſition and manner of his intimidated the lion or not: it had, however, ſuch an effect upon the creature that it likewiſe made a ſtand; and what was ſtill more ſingular, laid itſelf down at the diſtance of a few paces from the heap of ſtones ſeemingly quite unconcerned. The ſportſman, in the mean while, did not dare to ſtir a ſtep from the ſpot: beſides, in his flight, he had the misfortue to loſe his powder horn. At length, after waiting a good half hour, the lion roſe up, and at firſt went very ſlowly, and ſtep by ſtep, as if it had a mind to ſteal off; but as ſoon as it got to a greater diſtance, it began to bound away at a great rate."

Our author alſo relates the following occurrence, as ſerving to ſhow the cowardice and inſidious diſpoſition of the lion. "An elderly Hottentot in the ſervice of a Chriſtian, near the upper part of Sunday river on the Cambdebo ſide, perceived a lion following him at a great diſtance for two hours together. Thence he naturally concluded, that the lion only waited for the approach of darkneſs, in order to make him his prey: and in the mean time, could not expect any other than to ſerve for this fierce animal's ſupper, inaſmuch as he had no other weapon of defence than a ſtick, and knew that he could not get home before it was dark. But as he was well acquainted with the nature of the lion, and the manner of its ſeizing upon its prey, and at the ſame time had leiſure between whiles to ruminate on the ways and means in which it was moſt likely that his exiſtence would be put an end to, he at length hit on a method of ſaving his life. For this purpoſe, inſtead of making the beſt of his way home, he looked out for a *kilpkrans* (ſo they generally call a rocky place level and plain at top, and having a perpendicular precipice on one ſide of it), and ſitting himſelf down on the edge of one of theſe precipices, he found to his great joy, that the lion likewiſe made a halt, and kept the ſame diſtance as before. As ſoon as it grew dark, the Hottentot ſliding a little forwards, let himſelf down below the upper edge of the precipice upon ſome projecting part or cleft of the rock, where he could juſt keep himſelf from falling. But in order to cheat the lion ſtill more, he ſet his hat and cloak on the ſtick, making with it at the ſame time a gentle motion juſt over his head, and a little way from the edge of the mountain. This crafty expedient had the deſired ſucceſs. He did not ſtay long in that ſituation, before the lion came creeping ſoftly towards him like a cat, and miſtaking the ſkin-cloak for the Hottentot himſelf, took his leap with ſuch exactneſs and preciſion, as to fall headlong down the precipice, directly cloſe to the ſnare which had been ſet up for him; when the Hottentot is ſaid, in his great joy, exultingly to have called out *t'katſi!* an interjection of very extenſive import and ſignification."

This is not the only inſtance of lions in Africa being enſnared in the midſt of their leap. In the outhouſes and waſte grounds about farms, where a lion has been upon the watch for ſome animal and miſſed it, or where they have other reaſons to expect him, they ſet up the figure of a man cloſe up by the ſide of ſeveral loaded guns; ſo that theſe diſcharge themſelves into the body of the beaſt at the very inſtant that he ſprings or throws himſelf upon the dreſſed figure. As this is done with ſo much eaſe and ſucceſs, and as they hardly ever think it worth while in Africa to take lions alive, they ſeldom give themſelves the trouble of catching them by means of pit-falls.

"It is ſingular (Dr Sparman remarks), that the lion, which, according to many, always kills his prey immediately if it belongs to the brute creation, is reported frequently, although provoked, to content himſelf with merely wounding the human ſpecies; or at leaſt to wait ſome time before he gives the fatal blow to the unhappy victim he has got under him. In ſeveral places through which I paſſed, they mentioned to me by name a father and his two ſons, who were ſaid to be ſtill living, and who being on foot near a river on their eſtate in ſearch of a lion, this latter had ruſhed out upon them, and thrown one of them under feet: the two others, however, had time enough to ſhoot the lion dead upon the ſpot, which had lain almoſt acroſs the youth ſo nearly and dearly related to them, without having done him any particular hurt. I myſelf ſaw, near the upper part of Duyven-hoek-river, an elderly Hottentot, who at that time (his wounds being ſtill open) bore under one eye and underneath his cheek-bone the ghaſtly marks of the bite of a lion, which did not think it worth his while to give him any other chaſtiſement for having, together with his maſter whom I alſo knew) and ſeveral other Chriſtians, hunted him with great intrepidity, though without ſucceſs. The converſation ran every where in this part of the country upon one Bota, a farmer and captain in the militia, who had lain for ſome time under a lion, and had received ſeveral bruiſes from the beaſt, having been at the ſame time a good deal bitten by him in one arm, as a token to remember him by; but, upon the whole, had in a manner had his life given him by this noble animal. The man was ſaid then to be living in the diſtrict of Artaquas-kloof. I do not rightly know how to account for this merciful diſpoſition towards mankind. Does it proceeed from the lion's greater reſpect and veneration for man, as being equal to, or even a mightier tyrant than, himſelf among the animal creation? or is it merely from the ſame caprice which has ſometimes induced him not only to ſpare the lives of men or brute creatures who have been given up to him for prey, but even to careſs them, and treat them with the greateſt kindneſs? Whims and freaks of this kind have perhaps in a great meaſure acquired the lion the reputation it has for generoſity; but I cannot allow this ſpecious name, ſacred only to virtue, to be laviſhed upon a wild beaſt. Slaves, indeed, and wretches of ſervile minds, are wont with this attribute to flatter their greateſt tyrants; but with what ſhow of reaſon can this attribute be beſtowed upon the moſt powerful tyrant among quadrupeds, becauſe it does not exerciſe an equal degree of cruelty upon all occaſions? That the lion does not, like the wolf, tiger, and ſome other beaſts of prey, kill a great deal of game or cattle at one time, perhaps proceeds from this, that while he is employed in attacking one or two of them, the remainder fly farther than it accords with the natural indolence of this beaſt to follow them. If this be called *generoſity*, a cat may be ſtyled generous with reſpect to the rats; as I have ſeen this creature in the fields among a great number of the latter, where ſhe could have made a great havock at once, ſeize on a ſingle one only, and run off with it. The lion and the cat, likewiſe very much reſemble each other, in partly ſleeping out, and partly paſſing away in a quiet inactive ſtate, a great part of their time, in which hunger does not urge them to go in queſt of their prey.”

The lion's ſtrength, as already obſerved, is very great. Mr Sparman informs us, that “this animal was once ſeen at the Cape to take an heifer in his mouth, and though the legs of this latter dragged on the ground, yet, ſeemed to carry her off with the ſame eaſe as a cat does a rat. It likewiſe leaped over a broad dike with her, without the leaſt difficulty. A buffalo perhaps would be too cumberſome for this beaſt of prey, notwithſtanding his ſtrength, to ſeize, and carry off with him in the manner abovementioned. Two yeomen, upon whoſe veracity I can place ſome confidence, gave me the following account relative to this matter. Being a hunting near Boſhieſman-river with ſeveral Hottentots, they perceived a lion dragging a buffalo from the plain to a neighbouring woody hill. They, however, ſoon forced it to quit its prey, in order to make a prize of it themſelves; and found that this wild beaſt had had the ſagacity to take out the buffalo's large and unwieldy entrails in order to be able the eaſier to make off with the fleſhy and more eatable part of the carcaſe. The lion's ſtrength, however, is ſaid not to be ſufficient alone to get the better of ſo large and ſtrong an animal as the buffalo; but, in order to make it his prey, this fierce creature is obliged to have recourſe both to agility and ſtratagem; inſomuch, that ſtealing on the buffalo, it faſtens with both its paws upon the noſtrils and mouth of the beaſt, and keeps ſqueezing them cloſe together, till at length the creature is ſtrangled, wearied out, and dies. A certain coloniſt, according to report, had had an opportunity of ſeeing an attack of this kind; and others had reaſon to conclude that ſomething of this nature had paſſed, from ſeeing buffaloes, which had eſcaped from the clutches of lions, and bore the marks of the claws of theſe animals about their mouth and noſe. They aſſerted, however, that the lion itſelf riſked its life in ſuch attempts, eſpecially if any other buffalo was at hand to reſcue that which was attacked. It was ſaid, that a traveller once had an opportunity of ſeeing a female buffalo with her calf, defended by a river at her back, keep for a long time at bay five lions which had partly ſurrounded her; but did not, at leaſt as long as the traveller looked on, dare to attack her. I have been informed, from very good authority, that on a plain to the eaſt of Kromme-river, a lion had been gored and trampled to death by a herd of cattle; having, urged probably by hunger, ventured to attack them in broad day-light.” This the reader will, perhaps, not ſo much wonder at, when he is told, that in the day-time, and upon an open plain, 12 or 16 dogs will eaſily get the better of a large lion. Nor is there any neceſſity, Dr Sparman ſays, for the dogs with which the lion is to be hunted to be very large and trained up to the ſport, as M. Buffon thinks they ſhould be, the buſineſs being perfectly well accompliſhed with the common farm-houſe dogs. When theſe have got pretty near the lion, the latter, from a greatneſs of ſoul, does not offer to fly any farther, but ſits himſelf down. The hounds then ſurround him, and ruſhing on him all at once, are thus, with their united ſtrength, able to tear in pieces, almoſt in an inſtant, the ſtrongeſt of all wild beaſts. It is ſaid, that he has ſeldom time to give more than two or three ſlight ſtrokes with his paws (each of which ſtrokes is inſtant death) to an equal number of his aſſailants. M. de Buffon aſſerts alſo, that the lion may be hunted on horſeback, but that the horſes as well as the dogs muſt be trained to it. Dr Sparman, however, aſſures us, that the coloniſts hunt the lion with common hunting horſes.

It is ſaid, that horſes in battle, or in other dangerous enterpriſes, ſuffer themſelves more willingly to be capariſoned by their riders than at other times. This circumſtance Dr. Sparman likewiſe remarked in theſe animals on the above expeditions. “Our horſes (ſays he), the very ſame as had ſeveral times, in the manner abovementioned, ſhown their diſquietude when the lion happened to be in the vicinity of them, and which were not in the leaſt trained to the chaſe, once exhibited a ſpirit in the purſuit of two large lions, equal to that which they had ſhown at other times in chaſing the timid gazels; though, in fact, hunting horſes ſeem to partake much more of their maſter's pleaſure in the chaſe. I remember, in particular, at Agter Bruntjes Hoogte, I rode a horſe, which, by a tremulous ſound iſſuing from its cheſt, cocking up its ears, and prancing and capering, diſcovered, in an unequivocal manner, its ardour for the chace, whenever it came in ſight of the larger kind of game. There have even been inſtances of hunting horſes, who, when the hunter has jumped off their backs in order to diſcharge his piece, but has miſſed his mark, have, in their eagerneſs for the chace, not allowed him time ſufficient to mount again, but followed the game alone for hours together, cloſe at its very heels, in all its turnings and windings.”

The chaſe of the lion on horſeback is carried on at the Cape in the following manner, as deſcribed by Dr Sparman.

“It is only on the plains that the hunters venture to go out on horſeback in this chaſe. If the lion keeps in ſome coppice or wood, on a riſing ground, they endeavour to teize it with dogs till it comes out; they likewiſe prefer going together two or more in number, in order to be able to aſſiſt and reſcue each other, in caſe the firſt ſhot ſhould not take place. When the lion ſees the hunters at a great diſtance it is univerſally allowed, that he takes to his heels as faſt as ever he can, in order to get out of their ſight; but if they chance to diſcover him at a ſmall diſtance from them, he is then ſaid to walk off in a ſurly manner, but without putting himſelf in the leaſt hurry, as though he was above ſhowing any fear, when he finds himſelf diſcovered or hunted. He is therefore reported likewiſe, when he finds himſelf purſued with vigour, to be ſoon provoked to reſiſtance, or at leaſt he diſdains any longer to fly. Conſequently he ſlackens his pace, and at length only ſlides ſlowly off, ſtep by ſtep, all the while eying his purſuers aſkaunt; and finally makes a full ſtop, and turning round upon them, and at the ſame time giving himſelf a ſhake, roars with a ſhort and ſharp tone, in order to ſhow his indignation, being ready to ſeize on them, and tear them in pieces. This is now preciſely the time for the hunters to be upon the ſpot, or elſe to get as ſoon as poſſible within a certain diſtance of him, yet ſo as at the ſame time to keep a proper diſtance from each other; and he that is neareſt, or is moſt advantageouſly poſted, and has the beſt mark of that part of the lion's body which contains his heart and lungs, muſt be the firſt to jump off his horſe, and ſecuring the bridle by putting it round his arm, diſcharge his piece; then in an inſtant recovering his ſeat, muſt ride obliquely athwart his companions; and, in fine, giving his horſe the reins, muſt truſt entirely to the ſpeed and fear of this latter, to convey him out of the reach of the fury of the wild beaſt, in caſe he has only wounded him, or has abſolutely miſſed him. In either of theſe caſes, a fair opportunity preſents itſelf for ſome of the other hunters to jump off their horſes directly, as they may then take their aim and diſcharge their pieces with greater coolneſs and certainty. Should this ſhot likewiſe miſs (which, however, ſeldom happens), the third ſportſman rides after the lion, which at that inſtant is in purſuit of the firſt or the ſecond, and, ſpringing off his horſe, fires his piece, as ſoon as he has got within a proper diſtance, and finds a ſufficiently convenient part of the animal preſent itſelf, eſpecially obliquely from behind. If now the lion turns upon him too, the other hunters turn again, in order to come to his reſcue with the charge which they loaded with on horſeback, while they were flying from the wild beaſt. No inſtance has ever been known of any misfortune happening to the hunters in chaſing the lion on horſeback. The African coloniſts, who are born in, or have had the courage to remove into the more remote parts of Africa, which are expoſed to the ravages of wild beaſts, are moſtly good markſmen, and are far from wanting courage. The lion that has the boldneſs to ſeize on their cattle, which are the moſt valuable part of their property, ſometimes at their very doors, is as odious to them as he is dangerous and noxious. They conſequently ſeek out theſe animals, and hunt them with the greateſt ardour and glee, with a view to exterminate them.”

Tiger.

II. The *Tigris*, or TIGER. The ſize of this animal, according to ſome authors, is larger, and, according to others, ſomewhat leſs, than the lion. M. de la Landemagon aſſures us, that he has ſeen a tiger in the Eaſt-Indies 15 feet long, including undoubtedly the length of the tail, which, ſuppoſing it to be four feet, makes the body of the tiger about 11 feet in length. The ſkeleton preſerved in the cabinet of the French king, indicates that the animal was about ſeven feet long from the point of the muzzle to the origin of the tail; but then it muſt be conſidered, that he was caught young, and lived all his days in confinement. The head of the tiger is large and roundiſh; and the ears are ſhort, at a great diſtance from each other. The form of the body has a great reſemblance to that of the panther. The ſkin is of a darkiſh yellow colour, ſtriped with long black ſtreaks; the hair is ſhort, excepting on the ſides of the head, where it is about four inches long. The point of the tail is black, and the reſt of it is interſperſed with black rings. His legs and claws reſemble thoſe of the lion, only the legs are much ſhorter in proportion to the ſize of the animal.

The tiger is more ferocious, cruel, and ſavage than the lion. Although gorged with carnage, his thirſt for blood is not appeaſed; he ſeizes and tears in pieces a new prey with equal fury and rapacity, the very moment after devouring a former one; he lays waſte the country he inhabits; he neither dreads the aſpect nor the weapons of men; puts to death whole troops of domeſtic animals; and attacks young elephants, rhinoceros's, and ſometimes even braves the lion himſelf.

The tiger ſeems to have no other inſtinct, but a conſtant thirſt after blood, a blind fury which knows no bounds or diſtinction, and which often ſtimulates him to devour his own young, and to tear the mother in pieces for endeavouring to defend them. He lies in wait on the banks of rivers, &c. where the heat of the climate obliges other animals to repair for drink. Here he ſeizes his prey, or rather multiples his maſſacres; for he no ſooner kills one animal, than he flies with equal fury upon the next, with no other view but to plunge in his head into their bodies and drink their blood. However, when he kills a large animal, as a horſe or a buffalo, he ſometimes does not tear out the entrails on the ſpot; but, to prevent any interruption, he drags them off to the wood, which he performs with incredible ſwiftneſs. This is a ſufficient ſpecimen of the ſtrength of this rapacious animal.

Neither force, reſtraint, or violence, can tame the tiger. He is equally irritated with good as with bad treatment: he tears the hand which nouriſhes him with equal fury, as that which adminiſters blows: he roars and is enraged at the ſight of every living creature. Almoſt every natural hiſtorian agrees in this horrible character.

There is a ſort of cruelty in their devaſtation, unknown to the generous lion; as well as a poltroonry in their ſudden retreat on any diſappointment. "I was informed (ſays Mr Pennant) by very good authority, that in the beginning of this century, ſome gentlemen and ladies, being on a party of pleaſure, under a ſhade of trees, on the banks of a river in Bengal, obſerved a tiger preparing for its fatal ſpring; one of the ladies, with amazing preſence of mind, laid hold of an umbrella, and furled it full in the animal's face, which inſtantly retired, and gave the company opportunity of removing from ſo terrible a neighbour. Another party had not the ſame good fortune; a tiger darted among them while they were at dinner, ſeized on one gentleman, and carried him off, and he never was more heard of." The tiger attacks all ſorts of animals, even the lion; and it has been known that both have periſhed in their combats. There is in ſome parts of India a popular notion, that the rhinoceros and the tiger are in friendſhip, becauſe they are often found near each other. But according to Mr Pennant, the fact is, that the rhinoceros, like the hog, loves to wallow in the mire; and on that account frequents the banks of rivers: the tiger, to quench its raging thirſt, is met with in places contiguous to them.

Pliny has been frequently taken to taſk by the moderns, for calling the tiger *animal tremendæ velocitatis*: they allow it great agility in is bounds, but deny it ſwiftneſs in purſuit. Two travellers of authority, however, both eye-witneſſes, confirm what Pliny ſays: the one indeed only mentions in general its vaſt fleetneſs; the other ſaw a trial between one and a ſwift horſe, whoſe rider eſcaped merely by getting in time amidſt a circle of armed men. The chaſe of this animal was a favorite diverſion with the great Cam hi, the Chineſe monarch, in whoſe company Mr Bell *, that faithful traveller, and the Pere Gerbilion, ſaw theſe proofs of the tiger's ſpeed.

The tiger, according to Mr Pennant, is peculiar to Aſia; and is found as far north as China and Chineſe Tartary, and about lake Aral and the Altaic mountains. It inhabits mount Ararat and Hyrcania, of old famous for its wild beaſts; but the greateſt numbers, the largeſt, and the moſt cruel, are met with in India and its iſlands. In Sumatra, the natives are ſo infatuated that they ſeldom kill them, having a notion, that they are animated by the ſouls of their anceſtors.

The tiger has always been a more rare animal than the lion; and yet brings forth an equal number of young, namely, four or five at a litter. The female is furious at all times; but when her young are attempted to be taken from her, her rage is redoubled: ſhe braves every danger; ſhe purſues the raviſhers, who are obliged, when hard preſſed, to drop one of the young in order to retard her motion; ſhe ſtops, takes it up, and carries it into ſome ſecret part of the foreſt; but inſtantly returns and purſues the hunters into their villages or boats.

The tiger moves the ſkin of his face, grinds his teeth, and roars, like a lion; but the ſound of his voice is different.

Panther.

III. The *Pardus*, or PANTHER.—It is about the ſize of a large dog, and has a great reſemblance to a domeſtic cat. The tongue is rough, and remarkably red; the teeth are ſtrong and ſharp; the ſkin is exceedingly beautiful, being of a yellow colour, variegated with roundiſh black ſpots, and the hair is ſhort. It has a cruel and ferocious aſpect; his motions are briſk and lively: his cry reſembles the growl of an enraged dog, but is more ſtrong and rough.

The panther inhabits Africa, from Barbary to the remoteſt parts of Guinea. This ſpecies is next in ſize to the tiger; next to it in cruelty, and in its general enmity to the animal creation; it is to Africa what the former is to Aſia, with this alleviation, that it prefers the fleſh of brutes to that of mankind; but when preſſed with hunger, attacks every living creature without diſtinction. Its manner of taking its prey is the ſame with that of the tiger, always by ſurpriſe, either lurking in thickets or creeping on its belly till it comes within reach: it will alſo climb up trees in purſuit of monkies and leſſer animals; ſo that nothing is ſecure from its attacks. He is not ſo perfectly ungovernable as the tiger: but, notwithſtanding all attempts to render him obedient and tractable, he may rather be ſaid to be ſubdued than tamed; for he never entirely loſes his natural ferocity. Accordingly, when kept with a view to the hunting of bucks, goats, or other animals, great care is neceſſary in training him, and ſtill greater in conducting him. When leading out to the field, they put him in a cage and carry him in a cart. When the game is ſprung, they open the door of the cage; he inſtantly ſprings towards the animal, often ſeizes him in a few bounds, throws him to the ground, and ſtrangles him. But, if he happens to miſs his aim, he becomes mad with rage, and ſometimes falls upon his maſter, who, in order to prevent accidents of this kind, generally carries along with him pieces of fleſh, or perhaps a lamb or a kid, which he throws to him in order to appeaſe his fury.

The ancients were well acquainted with theſe animals. Theſe, and the leopards, were the *Variæ* and *Pardi* of the old writers: one ſhould think that the Romans would have exhauſted the deſarts of Africa by the numbers they drew from thence for their public ſhows. Scaurus exhibited at one time 150 panthers;

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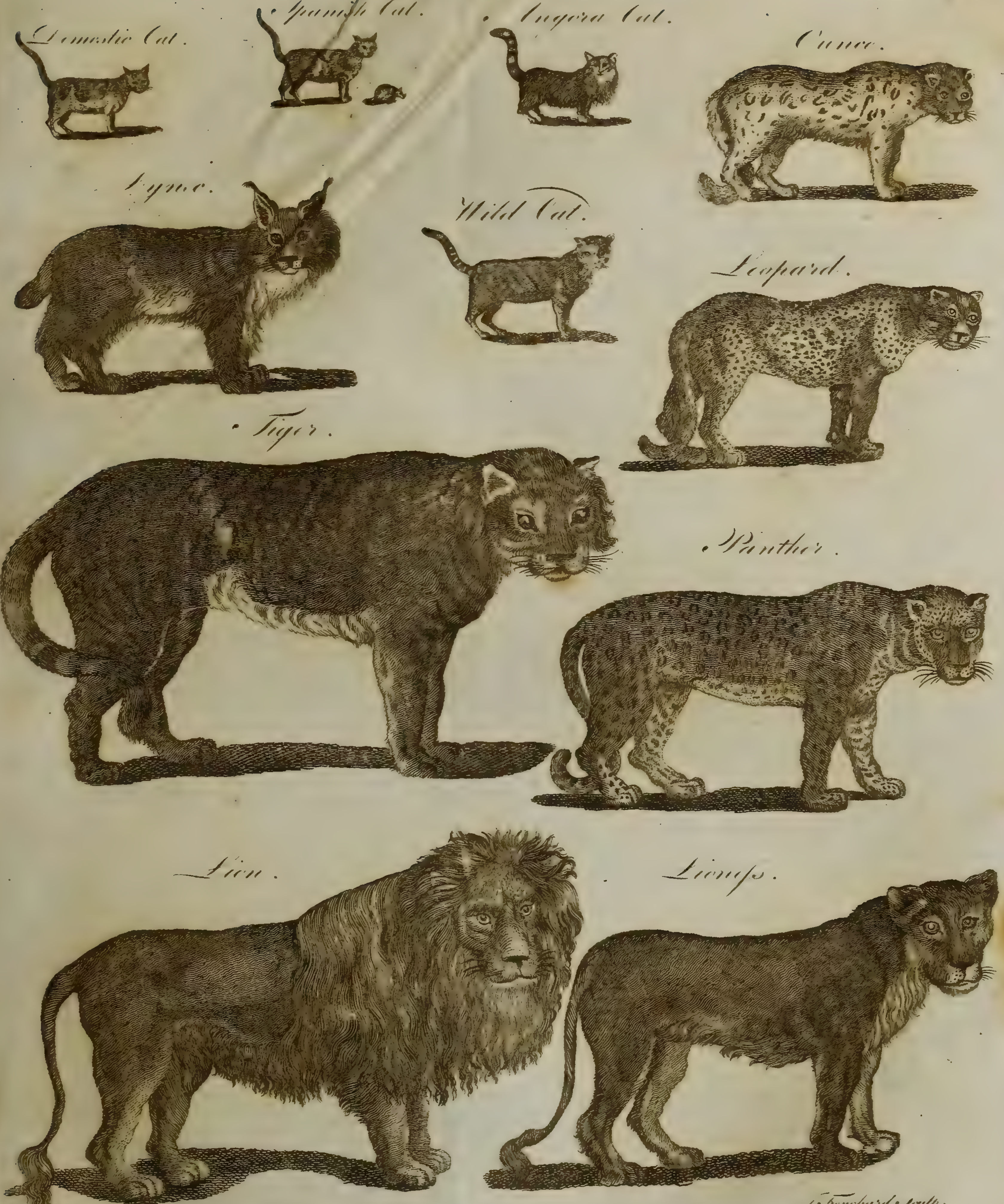
* *Travels*, vol.ii.p.91.

FELIS. Plate CXCI.



J. Trenchard. sculp.

Pompey the Great, 410 ; Auguſtus, 420. Probably they thinned the coaſts of Mauritania of theſe animals, but they ſtill ſwarm in the ſouthern parts of Guinea.—Oppian deſcribes two ſpecies of panthers, a large ſpecies and a ſmall one ; the firſt of which has a ſhorter tail than the leſſer, and may poſſibly be this kind.—An animal of this ſpecies is found in Buckharia, called there *Babr*: it is ſeven feet long, very deſtructive to horſes, and even camels; the ſkin is fine, and valued in Ruſſia at 1 l. Sterling.—In China there is a moſt remarkable kind, called there *Louchu*, whoſe ſkins ſell at 6 l. Sterling a-piece. It muſt here alſo be obſerved, that there are in the furriers ſhops in London, ſkins in moſt reſpects reſembling thoſe of the panther ; which, they aſſure us, come from the Spaniſh ſettlements in the Weſt-Indies : Theſe ſkins equal thoſe of the old continent in beauty and ſize.

Though M. Buffon denies the panther to be an inhabitant of America, yet Mr Pennant is of opinion that the ſame, or a variety at leaſt, inhabits that country. 1. The figure of the ſpecies deſcribed by *Faber*, (*Hiſt. An. Nov. Hiſp.* p. 498) under the name of *Tigris Mexicana*, agrees exactly with that of the panther, as does alſo the deſcription in general. 2. Every other animal of this genus, which has yet been diſcovered in America, is far inferior in ſize and ſtrength to this; whoſe common height, Faber ſays, is four or five feet, and whoſe prey is wild cattle, horſes, &c. *M. Condamine*, and *Le Pere Cajetan Cattaneo*, ſpeak of the tigers (*i. e.* the panthers) of America, as equal and even ſuperior in ſize to thoſe of Africa, and the colour as bright as gold ; and Ulloa deſcribes them as big as little horſes. 3. Notwithſtanding the venders of furs are not entirely to be relied on as to the countries their goods come from, yet the general opinion of the whole trade, that theſe ſkins were the product of Spaniſh America, is a further proof of their being common to both continents.

Once. IV. The *Uncia*, or ONCE, is leſs than the panther ; the tail is longer ; the hair is likewiſe longer, and of a whitiſh grey colour. The once is eaſily tamed ; and is employed in hunting in ſeveral parts of Aſia, where dogs are very ſcarce. He has not the delicate ſcent of a dog ; does not trace other animals by the ſmell ; neither can he run them down in a fair chace ; but lies in wait for their approach, and then darts upon them unawares. He leaps ſo nimbly, that he eaſily clears a ditch or a wall ſeveral feet high : beſides, he often climbs trees, waits till ſome animal paſſes, and inſtantly leaps upon them. This method of catching their prey, is practiſed by the panther and leopard, as well as by the once.—The once inhabits Barbary, Perſia, Hyrcania, and China ; from which laſt place the ſkins are brought into Ruſſia, and ſold for 20s. a piece. It is an animal of a more gentle and mild nature than moſt of the preceding. It is, like the next ſpecies, uſed for the chace of antelopes, and even hares ; but, inſtead of being conveyed in a waggon, is carried on the crupper on horſeback. It is under as much command as a ſetting-dog ; returns at the leaſt call, and jumps up behind its maſter. This animal is ſuppoſed to be the leſſer panther of Oppian, and the panthera of Pliny.

Leopard. V. The *Leopardus*, or LEOPARD, differs from the panther and the once, in the beauty of his colour, which is a lively yellow, with ſmaller ſpots than thoſe of the two latter, and diſpoſed in groups. He is larger than the once, and leſs than the panther. He inhabits Senegal and Guinea ; and ſpares neither man nor beaſt. When beaſts of chace fail, the leopards deſcend from the internal parts of Africa in crowds, and make great havock among the numerous herds that cover the rich meadows of the lower Guinea. It tears its prey to pieces with both claws and teeth ; but is always thin, though perpetually devouring.—The panther is its enemy, and deſtroys numbers of them. The negreſſes make collars of their teeth, and attribute to them certain virtues. The negroes take theſe animals in pit-falls, covered at the top with ſlight hurdles, on which is placed ſome fleſh as a bait. They make a banquet of their fleſh, which is ſaid to be as white as veal, and very well taſted. Leopards ſkins are often brought to Europe, and reckoned very valuable. In Aſia theſe animals are found in the mountains of Caucaſus, from Perſia to India ; and alſo in China, where they are called *Poupi*. By the Bucharian traders, who often bring their ſkins to Ruſſia, they are ſtyled *Bars*. The leopard inhabits alſo Arabia, where it is called *Nemr*. We are informed by Mr Forſkal, that in that country, as well as in Egypt, it will do no harm to man unleſs provoked ; but will enter houſes by night, and deſtroy the cats.

Jaguar. VI. The *Onca*, or American Tiger, (the JAGUAR of Buffon), is of a bright tawny colour ; the top of the back marked with long ſtripes of black ; the ſides with rows of irregular oblong ſpots ; open in the middle, which is of the ground-colour of the hair : the thighs and legs are marked with full ſpots of black, the breaſt and belly whitiſh : the tail not ſo long as the body. This ſpecies, which grows to the ſize of a wolf, and even larger, inhabits the hotteſt parts of South-America, from the iſthmus of Darien to Buenos Ayres. It is fierce, and deſtructive to man and beaſt. Like the tiger, it plunges its head into the body of its prey, and ſucks out the blood before it devours it. It makes a great noiſe in the night, like the howling of a hungry dog ; and is a very cowardly animal. It is eaſily put to flight, either by the ſhepherds dogs, or by a lighted torch, being very fearful of fire. It lies in ambuſh near the ſides of rivers ; and there is ſometimes ſeen a ſingular combat between this animal and the crocodile. When the jaguar comes to drink, the crocodile, ready to ſurpriſe any animal that approaches, raiſes its head out of the water ; upon which the former inſtantly ſtrikes its claws into the eyes of this dreadful reptile, the only penetrable part, who immediately dives under the water, pulling his enemy along with it, where they commonly both periſh.

Ocelot. VII. The *Pardalis*, Mexican panther, or the OCELOT of Buffon, has its head, back, upper part of the rump, and tail, of a bright tawny ; a black ſtripe extending along the top of the back, from head to tail ; and from the noſtrils to the corners of the eyes, there alſo runs a ſtripe of black ; the ſides are whitiſh, marked lengthways with long ſtripes of black, hollow and tawny in the middle, in which are ſprinkled ſome ſmall black ſpots ; the legs are whitiſh, varied with ſmall black ſpots ; and the tail is alſo varied with ſmall ſpots near its baſe, and larger near the end, which is black. It is above four times the ſize of a large cat, and ſtrongly

ſtrongly made. It inhabits Mexico, the neighbourhood of Carthagena, and Braſil. It lives in the mountains; and is very voracious, but fearful of mankind; preying on young calves, and different ſorts of game. It lurks amidſt the leaves of trees; and ſometimes will extend itſelf along the boughs as if dead, till the monkies, tempted by their natural curioſity, approaching to examine it, become its prey.

Hunting Leopard. VIII. The *Jubata*, or HUNTING LEOPARD, (*Guepard* Buff.) is of the ſize of a large grehound, of a long make, with a narrow cheſt and long legs. The colour of the body is a light tawny brown marked with numbers of ſmall round black ſpots; the neck is ſhaggy, and the tail is longer than the body. It inhabits India; where it is tamed, and trained for the chace of antelopes. For this purpoſe it is carried in a ſmall kind of waggon, chained and hoodwinked, till it approaches the herd: when firſt unchained, it does not immediately make its attempt, but winds along the ground, ſtopping and concealing itſelf till it gets a proper advantage, and then darts on the animals with ſurpriſing ſwiftneſs. It overtakes them by the rapidity of its bounds; but if it does not ſucceed in its firſt efforts, conſiſting of five or ſix amazing leaps, it miſſes its prey: loſing its breath, and finding itſelf unequal in ſpeed, it ſtands ſtill, gives up the point for that time, and readily returns to its maſter. This ſpecies is called in India, *Chittah*. It is uſed for the taking of jackals, as well as other animals.

Black Tiger. IX. The *Diſcolor*, or BLACK TIGER, (*Couguar Noir*, Buff.), is covered with ſhort very gloſſy hairs of a duſky colour; the throat, belly, and inſide of the legs, white. It grows to the ſize of a heifer of a year old, and has vaſt ſtrength in its limbs. It inhabits Braſil and Guiana; and is a cruel and fierce beaſt, but happily is a ſcarce ſpecies.

Puma. X. The *Concolor*, or PUMA (*Couguar*, Buff.) has a very ſmall head, ears a little pointed, and eyes large. The back, neck, rump, ſides, are of pale browniſh red, mixed with duſky hairs; the breaſt, belly, and inſide of the legs, cinereous. The tail is duſky and ferruginous, the tip black; and the teeth are of a vaſt ſize. It is long bodied, and high on its legs; the length from noſe to tail five feet three inches, of the tail two feet eight. This animal inhabits the continent of America, from Canada to Braſil: in South America is called *Puma*, and by Europeans miſtaken for the lion. It is the ſcourge of the colonies of the hotter parts of America, being fierce and ravenous to the higheſt degree. It ſwims over the broad rivers; attacks the cattle in the very incloſures; and when preſſed with hunger; ſpares not even mankind. In North America their fury ſeems to be ſubdued by the rigor of the climate; and the ſmalleſt cur, in company with its maſter, makes them ſeek for ſecurity, by running up trees: but then they are equally deſtructive to domeſtic animals, and are the greateſt nuiſance the planter has; when they lay in wait for the mooſe, or other deer, they lie cloſe on the branch of ſome tree till the animal paſſes beneath, when they drop upon and ſoon deſtroy them. They alſo make wolves their prey: In the Muſeum of the Royal Society, there is the ſkin of one which was killed juſt as it had pulled down a wolf. When it has ſatisfied itſelf with eating, it carefully conceals the reſt of the carcaſe, covering it with leaves: if any other touches the relics, it never comes near them again. It ſometimes purs like a cat, and at other times makes a great howling. The fur is ſoft, and of ſome value among the Indians, who cover themſelves with it during winter; and who alſo eat the fleſh, which is ſaid to be as good and as white as veal.

Margay. XI. The *Tigrina*, or MARGAY of Buffon, is about the ſize of a common cat. The upper part of the head, the neck, back, ſides, ſhoulders, and thighs, are of a bright tawny-colour: the face is ſtriped downwards with black: the ſhoulders and body are marked with ſtripes and oblong large black ſpots; the legs with ſmall ſpots; the thighs are whitiſh, ſpotted with black: The tail is very long, marked with black, tawny and grey. It inhabits South America, where it lives on the feathered game and on poultry. It is untameable. It makes a noiſe like the common cat; lives much in trees; is very active, and goes by bounds or leaps. It brings forth in all ſeaſons of the year, in hollow trees, and has two at a time.

Tiger-cat. XII. The *Capenſis*, Cape-Tiger, or TIGER-CAT of the Cape, is the *Nſuſſi* of Labat, who was the firſt who noticed this ſpecies, which he deſcribes as "of the ſize of a dog, with a coat as much ſtriped and varied as that of a tiger. Its appearance beſpeaks cruelty, and its eyes fierceneſs; but it is cowardly, and gets its prey only by cunning and inſidious arts." All theſe characters are perfectly applicable to the Cape cat; and it ſeems the animal is found in all parts of Africa, from Congo to the Cape of Good Hope, in an extent of country of about eleven degrees of latitude. Kolben alſo ſpeaks of a tiger buſh-cat, which he deſcribes as the largeſt of all the wild-cats of the Cape countries, and as ſpotted ſomething like a tiger. A ſkin of this animal was ſeen by Mr Pennant in a furrier's ſhop in London, who thought it came from the Cape of Good Hope; from this ſkin Mr Pennant gave the firſt deſcription which could be of any utility to a natural hiſtorian. All the other authors mention this animal in a vague manner. When Dr Forſter touched the ſecond time at the Cape of Good Hope in the year 1775, an animal of this ſpecies was offered him to purchaſe; but he refuſed buying it becauſe it had a broken leg, which made him apprehenſive of loſing it by death during the paſſage from the Cape to London. It was very gentle and tame. It was brought in a baſket to his apartment, where he kept it above 24 hours; which gave him the opportunity of deſcribing it more accurately than had hitherto been done, and of obſerving its manners and economy. Theſe he found to be perfectly analogous to thoſe of our domeſtic cats. It ate freſh raw meat, and was very much attached to its feeders and benefactors: tho' it had broke the fore leg by accident, it nevertheleſs was very eaſy. After it had been ſeveral times fed by our author, it ſoon followed him like a tame favourite cat. It liked to be ſtroked and careſſed; it rubbed its head and back always againſt the perſon's cloaths who fed it, and deſired to be made much of. It purred as our domeſtic cats do when they are pleaſed. It had been taken when quite young in the woods, and was not above eight or nine months old; but had already very nearly, if not quite, attained its full growth. The Doctor was told, that the tiger-cats live in mountainous and woody tracts; and that in their wild ſtate they are very great deſtroyers of hares, rabbits, yerbuas, young antelopes, lambkins, and of all the feathered tribe. A very particular technical deſcription of this ſpecies is given in the Phil. Tranſ. vol. lxxi. p. 4. with a figure, which the reader will ſee copied among other ſpecies in our plates.

Cat. XIII. The *Catus*, or Cat.

1. The *ferus*, or wild cat, is three or four times as large as the houſe cat; the head larger, and the face flatter. The teeth and claws are tremendous: its muſcles very ſtrong, as being formed for rapine: the tail is of a moderate length, but very thick, marked with alternate bars of black and white, the end always black: the hips and hind part of the lower joints of the leg are black: the fur is very ſoft and fine. The general colour of theſe animals is of a yellowiſh white, mixed with a deep grey: theſe colours, though they appear at firſt ſight confuſedly blended together, yet on a cloſe inſpection will be found to be diſpoſed like the ſtreaks on the ſkin of the tiger, pointing from the back downwards, riſing from a black liſt that runs from the head along the middle of the back to the tail.

This animal, may be called the *Britiſh tiger*. It is the fierceſt and moſt deſtructive beaſt they have; making dreadful havock among poultry, lambs, and kids. It inhabits the moſt mountainous and woody parts of Britain, living moſtly in trees, and feeding only by night. It multiplies as faſt as our common cats; and often the females of the latter will quit their domeſtic mates, and return home pregnant by the former.

They are taken either in traps or by ſhooting: in the latter caſe, it is very dangerous only to wound them; for they will attack the perſon who injured them, and have ſtrength enough to be no deſpicable enemy. Wild cats were formerly reckoned among the beaſts of chace; as appears by the charter of Richard II. to the abbot of Peterborough, giving him leave to hunt the hare, fox, and wild cat. The uſe of the fur was in lining of robes: but it was eſteemed not of the moſt luxurious kind; for it was ordained, "that no abbeſs or nun ſhould uſe more coſtly apparel than ſuch as is made of lamb's or cat's ſkins." In much earlier times it was alſo the object of the ſportſman's diverſion.

This animal is the ſtock or origin of the domeſtic cat in all its varieties.—It inhabits the woods of moſt parts of Europe, but none are found in the vaſt woods of Ruſſia or Siberia. It dwells with the common lynx in all the wooded parts of the mountains of Caucaſus and their neighbourhood; and is moſt deſtructive to lambs, kids, fawns, and to all ſorts of feathered game.

2. The *domeſticus*, or tame cat, is ſo well known, that it requires no deſcription. It is an uſeful, but deceitful domeſtic. Although when young they are playful and gay, they poſſeſs at the ſame time an innate malice and perverſe diſpoſition, which increaſes as they grow up, and which education learns them to conceal, but never to ſubdue. Conſtantly bent upon theft and rapine, though in a domeſtic ſtate, they are full of cunning and diſſimulation; they conceal all their deſigns; ſeize every opportunity of doing miſchief, and then fly from puniſhment. They eaſily take on the habits of ſociety, but never its manners; for they have only the appearance of friendſhip and attachment. This diſingenuity of character is betrayed by the obliquity of their movements and the ambiguity of their looks. In a word, the cat is totally deſtitute of friendſhip; he thinks and acts for himſelf alone. He loves eaſe, ſearches for the ſofteſt and warmeſt places to repoſe himſelf. The cat is likewiſe extremely amorous; and, which is very ſingular, the female is more ardent than the male: ſhe not only invites, but ſearches after and calls upon him to ſatisfy the fury of her deſires; and, if the male diſdains or flies from her, ſhe purſues, bites, and in a manner compels him. This heat of paſſion in the females laſts but nine or ten days, and happens twice in the year, namely, in the ſpring and autumn; however, in ſome it happens thrice or four times in the year. The female goes with young 55 or 58 days, and generally produces four or five at a litter. As the male has an inclination to deſtroy the young, the female takes care to conceal them from him; and, when ſhe is apprehenſive of a diſcovery, ſhe takes them up in her mouth one by one, and hides them in holes or inacceſſible places. When ſhe has nurſed a few weeks, ſhe brings them mice, ſmall birds, &c. in order to learn them to eat fleſh. But it is worth notice, that theſe careful and tender mothers ſometimes become unnaturally cruel, and devour their own offspring.

The cat is incapable of reſtraint, and conſequently of being educated to any extent. However, we are told, that the Greeks in the iſland of Cyprus trained this animal to catch and devour ſerpents, with which that iſland was greatly infeſted. This, however, was not the effect of obedience, but of a general taſte for ſlaughter; for he delights in watching, attacking, and deſtroying all kinds of weak animals indifferently. He has no delicacy of ſcent, like the dog; he hunts only by the eye; neither does he properly purſue; he only lies in wait, and attacks animals by ſurpriſe; and after he has caught them, he ſports with and torments them a long time, and at laſt kills them (when his belly is full), purely to gratify his ſanguinary appetite.

The eye of the cat differs greatly from that of moſt other animals. The pupil is capable of a great degree of contraction and dilatation. It is narrow and contracted like a line during the day, round and wide in the dark. It is from this conformation of the eye that the cat ſees beſt in the night, which gives him a great advantage in diſcovering and ſeizing his prey.

Although cats live in houſes, they can hardly be called *domeſtic* animals; they may rather be ſaid to enjoy full liberty; for they never act but according to their own inclination. Beſides, the greateſt part of them are half wild; they do not know their maſters; and frequent only the barns, out-houſes, &c. unleſs when preſſed with hunger.

Cats have a natural antipathy at water and cold. They likewiſe hate bad ſmells; but they have an affection for certain aromatic ſmells, and are tranſported with the root of the valerian.

Cats take about 18 months before they come to their full growth; but they are capable of propagation in 12 months, and retain this faculty all their life, which generally extends to nine or ten years. They eat ſlowly, and are peculiarly fond of fiſh. They drink frequently; their ſleep is light; and they often aſſume the appearance of ſleeping, when in reality they are meditating miſchief. They walk ſoftly, and without making any noiſe. As their hair is always dry, it eaſily gives out an electrical fire, which becomes viſible when rubbed acroſs in the dark. Their eyes likewiſe ſparkle in the dark like diamonds.—The cat, when pleaſed, purrs, and moves its tail: when angry, it ſpits, hiſſes, and ſtrikes with its foot. It waſhes its face with its forefoot (Linnæus ſays at the approach of a ſtorm): it always lights on its feet: it is even proverbially tenacious of life.

Our anceſtors ſeem to have had a high ſenſe of the utility of this animal. That excellent prince *Hoel dda*, or Howel the Good, did not think it beneath him (among his laws relating to the prices, &c. of animals*), to include that of the cat; and to deſcribe the qualities it ought to have. The price of a kitten before it could ſee was to be a penny; till it caught a mouſe, twopence; when it commenced mouſer, four pence. It was required beſides, that it ſhould be perfect in its ſenſes of hearing and ſeeing, be a good mouſer, have the claws whole, and be a good nurſe: but if it failed in any of theſe qualities, the ſeller was to forfeit to the buyer the third part of its value. If any one ſtole or killed the cat that guarded the prince's granary, he was to forfeit a milch-ewe, its fleece and lamb; or as much wheat as, when poured on a cat ſuſpended by its tail (the head touching the floor), would form a heap high enough to cover the tip of the former. This laſt quotation is not only curious, as being an evidence of the ſimplicity of ancient manners, but it almoſt proves to a demonſtration, that cats are not aborigines of Britain, or known to the earlieſt inhabitants. The large prices ſet on them (if we conſider the high value of ſpecie at that time †), and the great care taken of the improvement and breed of an animal that multiplies ſo faſt, are almoſt certain proofs of their being little known at that period.

b, The Angorenſis, or cat of Angora, with hair of a ſilvery whiteneſs and ſilky texture, and very long, eſpecially about the neck, where it forms a fine ruff. It is a large variety; found about Angora, the ſame country which produces the fine-haired goat. It degerates after the firſt generation in our climate. A variety of this kind is found in China with pendent ears, of which the Chineſe are very fond, and ornament their necks with ſilver collars. They are cruel enemies to rats, and ſuppoſed to be the domeſtic animals with the Chineſe call *ſumxi*.

c, The Hiſpanicus, or tortoiſe-ſhell cat, has the hair varied with black, white, and orange.

d, The Cæruleus, or blue cat, a variety of a dun colour, or greyiſh black. It is much cultivated in Siberia on account of its fine fur: but was brought there, as well as the other domeſtic kinds, by the Ruſſians.

e, The Ruber, or wild red cat of Kolben, has a ſtreak of bright red running along the ridge of the back to the tail, and loſing itſelf in the grey and white on the ſides. The ſkins are ſaid to give eaſe in the gout, and are much valued on that account at the Cape.

Manul. XIV. The Manul, with the tail longer than that of the domeſtic cat, beſet thickly with hair, and of an equal thickneſs in all parts; encircled with ten black rings, the three next to the tip almoſt touching one another, the reſt more remote. It is about the ſize of a fox. The limbs are very robuſt; in which, and in colour, this animal greatly reſembles a lynx, afterwards deſcribed. It inhabits all the middle part of northern Aſia, from the Yaik, or Ural as it is now called, to the very Amur. It loves open, woodleſs, and rocky countries, and preys on the leſſer quadrupeds.

Lynx. XV. The Lynx is about 2½ feet long and 15 inches high. He has a great reſemblance to the common cat; but his ears are longer, and his tail is much ſhorter: his hair is ſtreaked with yellow, white, and black colours. The lynx inhabits the vaſt foreſts of the north of Europe, Aſia, and America. His eyes are brillant, his aſpect is ſoft, and his air is gay and ſprightly. Like the cat, he covers his urine with earth; he howls ſomething like the wolf, and is heard at a conſiderable diſtance; he does not run like the dog or wolf, but walks and leaps like a cat; he purſues his prey even to the tops of trees; neither wild cats nor ſquirrels can eſcape him; he lies in wait for ſtags, goats, hares, &c. and darts ſuddenly upon them; he ſeizes them by the throat and ſucks their blood, then opens the head and eats the brain; after this, he frequently leaves them, and goes in queſt of freſh prey. The colour of his ſkin changes according to the ſeaſon or the climate; the winter furs are more beautiful than thoſe of ſummer. Theſe furs are valuable for their ſoftneſs and warmth: numbers are annually exported from North America, and the north of Europe and Aſia; the farther north and eaſt they are taken, the whiter they are, and the more diſtinct the ſpots. Of theſe the moſt elegant kind is called *irbys*, whoſe ſkin ſells on the ſpot for one pound Sterling. The ancients * celebrated the great quickneſs of the lynx's ſight; and feigned that its urine was converted into a precious ſtone.

Serval. XVI. The Serval, has the upper part of the body of a duſky colour, interſperſed with round black ſpots; the belly, and the orbits of the eye, are white. This animal, which is very fierce and untameable, inhabits the woods in the mountainous parts of India; where it lives in trees, and breeds in them. It ſcarcely ever deſcends on the ground; but leaps with great agility from tree to tree. It is called by the natives of Malabar the *maraputé*, by the Portugueſe the *ſerval*.

Chaus. XVII. The Chaus, or Caſpian Lynx, has a round head, a little more oblong than that of the common cat; ſhining reſtleſs eye, with a moſt brilliant golden pupil: ears erect, oval, and lined with white hairs, their outſide reddiſh, their ſummits tufted with black. The hairs are coarſer than thoſe of the cat or common lynx, but leſs ſo than thoſe of the wolf. They are ſhorteſt on the head, but on the top of the back are above two inches long. The colour of the head and body is a yellowiſh brown: the breaſt and belly of a bright brown nearly orange. The tail reaches only to the flexure of the leg; is thick and cylindric; of the ſame colour with the back, tipped with black, and thrice obſcurely annulated with black near the end. In general appearance it has the form of the domeſtic cat. Its length is 2½ feet from the noſe to the baſe of the tail: its tail little more than 11 inches: its height before is 19 inches; behind, 20. It is ſometimes found larger, there being inſtances of its reaching the length of 3 feet from the noſe to the tail. This animal, which has been but lately diſcovered, inhabits the reeds and woods in the marſhy parts that border on the weſtern ſides of the Caſpian Sea, particularly about the caſtle Kiſlar on the river Terek

* Lege Wallicæ, p. 247, 248.

† Anno 948.

* Plin. viii. 8. xxviii. 8.

Terek, and in the Perſian provinces of Ghilan and Maſenderan, and frequently about the mouth of the Kur, the ancient Cyrus.—In manners, voice, and food, it agrees with the wild cat. It conceals itſelf in the day, and wanders over the flooded tracks in ſearch of prey; feeding on rats, mice, and birds, but ſeldom climbing trees. It is exceſſively fierce, and never frequents the haunts of mankind. It is ſo impatient of captivity, that one which was taken in a trap, and had a leg broken, refuſed for many days the food placed by it; but in its fury devoured the fractured limb, with pieces of the ſtake it was faſtened to, and broke all its teeth in the phrenſy of its rage.

Sivah Ghuſh.

XVIII. The *Caracal*, Sivah Ghush, or Perſian Lynx, with a lengthened face and ſmall head; very long, ſlender ears, terminated with a long tuft of black hairs; eyes ſmall: the upper part of the body is of a very pale reddiſh brown; and the belly and breaſt are whitiſh: the limbs are ſtrong and pretty long; and the tail is about half the length of the body. Theſe animals inhabit Perſia, India, and Barbary; where they are often brought up tame, and uſed in the chace of leſſer quadrupeds, and the larger ſort of birds, ſuch as cranes, pelicans, peacocks, &c. which they ſurpriſe with great addreſs. When they ſeize their prey, they hold it faſt with their mouth, and lie for a time motionleſs on it. They are ſaid to attend the lion, and to feed on the remains of the prey which that animal leaves. They are fierce when provoked; Dr Charleton ſays, he ſaw one fall on a hound, which it killed and tore to pieces in a moment, notwithſtanding the dog defended itſelf to the utmoſt.—The Arabian writers call it *anak el ard*; and ſay, that it hunts like the panther, jumps up at cranes as they fly, and covers its ſteps when hunting.

Libyan Lynx.

The Libyan Lynx is a variety with ſhort black tufts to the ears, which are white within, and of a lively red without; the tail white at the tip, annulated with four black rings, with black marks behind the fore legs. It is greatly inferior in ſize to the former; not larger than a common cat. It inhabits both Libya and Barbary.

Bay Lynx.

XIX. The *Rufa*, or Bay Lynx, with a ſhort tail, yellow irides, and upright ſharp-pointed ears, tufted with long black hairs: the colour of the head, back, ſides, and exterior parts of the legs, bright bay, obſcurely marked with duſky ſpots: from beneath each eye certain long black ſtripes, of an incurvated form, mark the cheeks; which, with the upper and under lip, whole underſide of the body, and inſides of the legs, are white: the upper part of the tail is barred with duſky ſtrokes; and next the end, one of a deep black; its tip and under ſide are white. This animal, which is about twice the bigneſs of a large cat, inhabits the inner parts of the ſtate of New-York.

Canadian Lynx.

XX The Canadian Lynx, with pale yellow eyes, and erect ears tufted with long black hair. The body is covered with ſoft and long fur, cinereous tinged with tawny, and marked with duſky ſpots, more or leſs viſible in different ſubjects, dependent on the age or ſeaſon in which the animal is killed: the legs are ſtrong and thick; the claws large. It is about three times the ſize of a common cat; the tail is only four inches long, tipt with black. This ſpecies inhabits the vaſt foreſts of North-America. It is called in Canada *le chat-cervier*, or *le loup-cervier*, on account of its being ſo deſtructive to deer; which it drops on from the trees, like the *puma*, and fixing on the jugular vein, never quits its hold till the exhauſted animal falls through loſs of blood. The Engliſh call it a *wild cat*. It is very deſtructive to their young pigs, poultry, and all kind of game. The ſkins are in high eſteem for the ſoftneſs and warmneſs of the fur; and great numbers are annually exported into Europe.

Cat-a-mountain.

XXI. The *Mountain Lynx*, or Cat-a-mountain, upright pointed ears, marked with two brown bars; with the head and upper part of the body of a reddiſh brown, with long narrow ſtripes of black; the ſides and legs with ſmall round ſpots: the chin and throat are of a clear white; the belly of a dull white. The length of the animal from noſe to tail, is two feet and an half; of the tail, eight inches. It inhabits North America; and is ſaid to be a gentle animal, and to grow very fat.

FELL (Dr John), a very learned Engliſh divine and biſhop, entered a ſtudent at Chriſt-church, Oxford, 1636. In 1648, he was ejected by the parliamentary viſitors, being then in holy orders: and from that time till the reſtoration lived at Oxford a retired and ſtudious life. He was inſtalled cannon of Chriſt-church, July 1660; and the year following, dean of that church; in which place he did great ſervices to the college, and reformed ſeveral abuſes. He was conſecrated biſhop of Oxford in 1675; and had leave to hold his deanry in *commendam*, that he might continue his ſervices to the college and univerſity. He publiſhed ſeveral works and died in 1686.

FELLING *of* Timber.—Many circumſtances are well known and conſtantly obſerved in the felling of timber for building, which, though to a haſty obſerver they might appear trifling, yet prove, on experience, to be of the utmoſt conſequence. One thing obſerved by M. de Buffon, which very greatly increaſes the ſolidity and ſtrength of timber, is, that the trees intended to be felled for ſervice ſhould firſt be ſtripped of their bark, and ſuffered to ſtand and die upon the ſpot before the cutting. The ſappy part or blea of the oak, becomes by this means as hard and firm as the heart; and the real ſtrength and denſity of the wood has been proved, by many experiments, to be greatly increaſed by it; nor is this a practice of any detriment to the proprietor, ſince the remaining ſtumps of theſe trees ſend up their young ſhoots as vigorouſly as if they had been cut down in their natural condition.

When any tree is to be cut down for timber, the firſt thing to be taken care of is a ſkilful diſbranching of ſuch limbs as may endanger in its fall: many trees are utterly ſpoiled for want of a previous care of this kind. In arms of timber that are very great, it is always neceſſary to chop or ſink in them cloſe to the bole, and then meeting it with down-right ſtrokes, it will be ſevered from the tree without ſplitting. In felling the tree, take care always to cut it as cloſe to the ground as poſſible, unleſs it is intended to be grubbed up: and the doing that is of advantage both to the timber and to the wood; for timber is never ſo much valued, if it be known to grow out of old ſtocks.

FELLOWSHIP, Company, or *Diſtributive-Proportion*, in arithmetic. See Arithmetic, n° 15.

FELO de se, in law, a perſon that lays deliberately violent hands on himſelf, and is the occaſion of his untimely death, whether by hanging, drowning, ſtabbing, ſhooting, or any other way.

FELON, in law, a perſon guilty of felony. See FELONY.

FELONY, in the general acceptation of the law, compriſes every ſpecies of crime, which occaſions at common law the forfeiture of lands or goods. This moſt frequently happens in thoſe crimes for which a capital puniſhment either is or was to be inflicted: for thoſe felonies that are called *clergyable*, or to which the benefit of clergy extends, were anciently puniſhed with death in all lay, or unlearned offenders; though now, by the ſtatute-law, that puniſhment is for the firſt offence univerſally remitted. Treaſon itſelf, ſays Sir Edward Coke, was anciently compriſed under the name of *felony*: and in confirmation of this we may obſerve, that the ſtatute of treaſons, 25 Ed. III. c. 2. ſpeaking of ſome dubious crimes, directs a reference to parliament; that it may be there adjudged, "whether they be treaſon or *other* felony." All treaſons, therefore, ſtrictly ſpeaking, are felonies; though all felonies are not treaſon. And to this alſo we may add, that all offences, now capital, are in ſome degree or other felony: but this is likewiſe the caſe with ſome other offences, which are not puniſhed with death; as ſuicide, where the party is already dead; homicide by chance-medley, or in ſelf-defence; and petit-larceny, or pilfering; all which are (ſtrictly ſpeaking), felonies, as they ſubject the committers of them to forfeitures. So that, upon the whole, the only adequate definition of felony ſeems to be that which is before laid down: viz. an offence which occaſions a total forfeiture of either lands or goods, or both, at the common law; and to which capital or other puniſhment may be ſuperadded, according to the degree of guilt.

Blackſt. Comment.

To explain this matter a little farther: The word *felony*, or *felonia*, is of undoubted feudal original, being frequently to be met with in the books of feuds, &c. but the derivation of it has much puzzled the juridical lexicographers, Pratæus, Calvinus, and the reſt: ſome deriving it from the Greek, φηλος, "an impoſtor or deceiver;" others from the Latin, *fallo fefelli*, to countenance which they would have it called *fellonia*. Sir Edward Coke, as his manner is, has given us a ſtill ſtranger etymology; that it is *crimen animo felleo perpetratum*, "with a bitter or galliſh inclination." But all of them agree in the deſcription, that it is ſuch a crime as works a forfeiture of all the offender's lands or goods. And this gives great probability to Sir Henry Spelman's Teutonic or German derivation of it: in which language indeed, as the word is clearly of feodal original, we ought rather to look for its ſignification, than among the Greeks and Romans. *Fe-lon* then, according to him, is derived from two northern words: FEE, which ſignifies (we well know) the fief, feud, or beneficiary eſtate; and LON, which ſignifies price or value. Felony is therefore the ſame as *pretium feudi*, the conſideration for which a man gives up his fief; as we ſay in common ſpeech, ſuch an act is as much as your life, or eſtate is worth. In this ſenſe it will clearly ſignify the feodal forfeiture, or act by which an eſtate is forfeited, or eſcheats, to the lord.

To confirm this, we may obſerve, that it is in this ſenſe, of forfeiture to the lord, that the feodal writers conſtantly uſe it. For all thoſe acts, whether of a criminal nature or not, which at this day are generally forfeiture of copyhold eſtates, are ſtyled *feloniæ* in the feodal law: "*ſcilicet, per quas feudum amittitur.*" As "*ſi domino reſervire noluerit;—ſi per annum et diem ceſſaverit in petenda inveſtitura;—ſi dominum ejuravit,* i. e. *negavit ſe a domino feudum habere;—ſi a domino in jus eum vocante, ter citatus non comparuerit;*"—all theſe, with many others, are ſtill cauſes of forfeiture in our copyhold eſtates, and were denominated *felonies* by the feodal conſtitutions. So likewiſe injuries of a more ſubſtantial or criminal nature were denominated *felonies*, that is, forfeitures: as aſſaulting or beating the lord; vitiating his wife or daughter, "*ſi dominum cucurbitaverit,* i. e. *cum uxore ejus concubuerit;*" all theſe are eſteemed felonies, and the latter is expreſsly ſo denominated, "*ſi fecerit feloniam, dominum forte cucurbitando.* And as theſe contempts, or ſmaller offences, were felonies or acts of forfeiture, of courſe greater crimes, as murder and robbery, fell under the ſame denomination. On the other hand, the lord might be guilty of felony, or forfeit his ſeignory to the vaſſal, by the ſame act as the vaſſal would have forfeited his feud to the lord. "*ſi dominus commiſſit feloniam, per quam vaſallus amitteret feudum ſi eam commiſſerit in dominum feudi proprietatem etiam dominus perdere debet.*" One inſtance given of this ſort of felony in the lord is beating the ſervant of his vaſſal, ſo as that he loſes his ſervice; which ſeems merely in the nature of a civil injury, ſo far as it reſpects the vaſſal. And all theſe felonies were to be determined, "*per laudamentum ſive judicium parium ſuorum,*" in the lord's court; as with us forfeitures of copyhold lands are preſentable by the homage in the court-baron.

Felony, and the act of forfeiture to the lord, being thus ſynonymous terms in the feodal law, we may eaſily trace the reaſon why, upon the introduction of that law into England, thoſe crimes which induced ſuch forfeiture or eſcheat of lands (and, by a ſmall deflexion from the original ſenſe, ſuch as induced the forfeiture of goods alſo) were denominated *felonies*. Thus it was that ſuicide, robbery, and rape, were felonies; that is, the conſequence of ſuch crimes was forfeiture; till by long uſe we began to ſignify by the term of *felony* the actual crime committed, and not the penal conſequence. And upon this ſyſtem only can we account for the cauſe, why treaſon in ancient times was held to be a ſpecies of felony; viz. becauſe it induced a forfeiture.

Hence it follows, that capital puniſhment does by no means enter into the true idea and definition of *felony*. Felony may be without inflicting capital puniſhment, as in the caſes inſtanced of ſelf-murder, excuſable homicide, and petit-larceny; and it is poſſible that capital puniſhments may be inflicted, and yet the offence be no felony; as in caſe of hereſy by the common law, which, though capital, never worked any forfeiture of lands or goods, an inſeparable incident to felony. And of the ſame nature was the puniſhment of ſtanding mute, without pleading to an indictment; which at the common law was capital, but without any forfeiture, therefore ſuch ſtanding mute was no felony. In ſhort, the true criterion of felony is forfeiture: for, as Sir Edwark Coke juſtly obſerves, in all felonies which are puniſhable with death, the offender loſes all his lands in fee-ſimple, and alſo his goods and chattels; in ſuch as are not puniſhable, his goods and chattels only.

The idea of felony is indeed ſo generally connected with that of capital puniſhment, that we find it hard to ſeparate them; and to this uſage the interpretations of the law do now conform. And therefore, if a ſtatute makes any new offence felony, the law implies that it ſhall be puniſhed with death, viz. by hanging, as well as with a forfeiture: unleſs the offender prays the benefit of clergy; which all felons are entitled once to have, unleſs the ſame is expreſsly taken away by ſtatute.

Felonies by ſtatute are very numerous; and as this work will not admit of a proper enumeration, we muſt refer to the Table of the quarto edition of the Statutes, where they are ſet forth in alphabetical order.

FELT, in commerce, a ſort of ſtuff deriving all its conſiſtence merely from being fulled, or wrought with lees and ſize, without either ſpinning or weaving.

Felt is made either of wool alone, or of wool and hair. Thoſe of French make, $3\frac{1}{2}$ yards long, and $1\frac{1}{2}$ broad, for cloaks, pay each 2 l. 14s. $1\frac{80}{100}$d. on importation; and draw-back 1l. 12s. 3 d. on exporting them again.

Felt-Spar, or *Rhombic Quartz*, the *petuntſe* of the Chineſe, a genus of ſiliceous earths, according to Cronſtedt, reſembling the jaſper in moſt reſpects. Its German name is *felt-ſpar*, from the word *feld*, which ſignifies a field, and likewiſe a compartment or regular ſurface. Hence, according to Mr Forſter, the word *feld-ſpar* ſignifies a ſpar compoſed of little compartments of rhombic or other figures. It ſtrikes fire with ſteel, and melts in a violent heat. M. Bayen, who analyſed it by acids, obtained a conſiderable quantity of argillaceous and ſiliceous earths, a ſmaller quantity of magneſia, and a ſtill ſmaller of calcareous earth and iron. It is found either ſparry or cryſtallized. The former ſpecies has ſeveral varieties. 1. White. 2. Reddiſh brown, occurring in the Swediſh and other granites. 3. Pale yellow. 4. Greeniſh, reſembling the ſchorl or cockle ſpar, but leſs fuſible, and more irregular in the figure. The cryſtallized kind is found in an iron mine in Weſtmanland in Sweden, ſeldom in the form of veins, and ſtill more rarely conſtituting the ſubſtance of whole mountains, but generally mixed either with quartz or mica; in which caſe it is called *granite*. When mixed with jaſper, along with ſome particles of quartz, cockle, and horn-blende, it is named *porphyry*.

Another kind of this ſtone, named by Mr. Bayen *white felt-ſpar*, is found in the duchy of Lorrain. It is of an opaque white colour, ſpotted on the outſide with ochre. It conſiſts of ſhining particles, which give it a ſparry appearance: it is very hard, and ſtrikes fire with ſteel, is affected by acids; and when analyſed by them, appears to contain one half its weight of ſiliceous earth, the other being compoſed of magneſia and iron.

Analogous to the felt-ſpar is that beautiful ſtone named *Labrador-ſtone*, lately brought to Europe. It was diſcovered ſome years ago by the Moravians, who have a colony among the Eſquimaux, in the country of Labrador in North America. It is found of a light or deep-grey colour, but for the moſt part of a blackiſh grey. When held in the light in various poſitions, it diſcovers a variety of colours, ſuch as the blue of lapis lazuli, graſs-green, apple-green, pea-green, and ſometimes, but more ſeldom, a citron yellow. Sometimes it has a colour between that of a red copper and tomback-grey; at other times the colours are between grey and violet. For the moſt part theſe colours are in ſpots, but ſometimes in ſtripes on the ſame piece. The ſtones are found in pretty large angular pieces, appear foliated when broken, and the fragments of a rhomboidal figure. Their ſpecific gravity is about 2.755, and in other reſpects they agree with the felt-ſpar. Werner informs us, that he has ſeen a piece of felt-ſpar at Gayer, which ſhowed a great variety of colours, but very pale.

Mr Kirwan obſerves on the felt-ſpar, in general, that it is found of many different colours, as white, yellow, red, brown, green, voilet, &c. ſometimes cryſtallized in rhombs, cubes, or parallelopipeds; at other times without any regular figure. It breaks like ſpar, but the texture is cloſe though lamellar. The ſpecific gravity, according to our author, is from 2.400 to 2.600, but Mr Gerchard ſays he found it as high as 3.500; in which caſe Mr Kirwan is of opinion that it was mixed with ſome metallic particles. It is harder than the fluor ſpars, but leſs ſo than quartz. It alſo melts without addition more perfectly and eaſily than the fluors, forming a whitiſh glaſs, which does not corrode the crucibles as that from fluor does. It is entirely diſſolved without efferveſcence by the microcoſmic ſalt and by borax; but unites with difficulty to fixed alkalies. In its cryſtallized ſtate it decrepitates in the fire, but not otherwiſe. It is found in looſe maſſes, about two inches long at moſt, without forming either veins or ſtrata. It is alſo found mixed with ſand or clay; or it is ſometimes found imbedded in other ſtones, as granite, &c. One hundred parts of the white ſpar contain 67 of ſiliceous, 14 of argillaceous, 11 of ponderous earth, and 8 of magneſia. According to Mr Kirwan, it is undoubtedly the ſtone uſed by the Saxons, as *petuntſa*, in their porcelain manufactures.

Cronſtedt, who ſuppoſes this ſtone to be of the ſame nature with jaſper, remarks that "if the rhombic quartz and jaſper were of the ſame ſpecies, that ſort of porphyry which is made up of theſe two bodies ought only to be ranked with the *jaſpers*, inſtead of being placed with the *ſaxa*. It is obſervable, however, in old monuments, which have been long expoſed to the air, that though porphyry had decayed in ſuch a manner as to loſe its poliſh, yet granite, though equally old, and compoſed for the moſt part of rhombic quartz, has preſerved its luſtre. This, however, does not contradict the poſſibility of rhombic quartz being the ſame ſubſtance with the jaſper: the calcareous ſpar, for inſtance, being found to bear the weather, and even fire, better than limeſtone."

FELTRIA, (anc. geog.), a town on the borders of Rhætia towards Italy. Now *Felitri*, in the territory of Venice, on the Piava. E. Long. 12. 16. N. Lat. 46°.

FELUCCA, in ſea-affairs, a little veſſel armed with ſix oars, frequent in the Mediterranean; which has this peculiarity, that its helm may be applied either in the head or ſtern, as occaſion requires.

FEMALE, (FÆMINA), a term peculiar to animals, ſignifying that ſex which conceives and generates its young within itſelf. See SEX and GENERATION.

FEMALE is alſo applied, figuratively, to things without life, from the reſemblance they bear to the females of animals. Thus we ſay a

FEMALE-Screw. See SCREW.

FEMALE-Flower. See *Femineus* FLOS.

FEMALE-Plant. See *Feminea* PLANTA.

FEMME COVERT, in law, a married woman. See COVERTURE.

FEMME Sole, an unmarried woman, whoſe debts, contracted before marriage, become thoſe of her huſband after it.

A femme-ſole merchant, is where a woman, in London, uſes a trade alone, without her huſband; on which account ſhe ſhall be charged without him.

FEMININE, in grammar, one of the genders of nouns. See GENDER.

The feminine gender is that which denotes the noun or name to belong to a female. In the Latin, the feminine gender is formed of the maſculine by altering its termination; particularly by changing *us* into *a*. Thus, of the maſculine *bonus equus*, "a good horſe," is formed the feminine *bona equa*, "a good mare;" ſo of *parvus homo*, "a little man," is formed *parva fæmina*, "a little woman," &c.

In French, the feminine gender is expreſſed, not by a different termination, but by a different article: thus, *le* is joined to a male, and *la* to a female.

In Engliſh, we are generally more ſtrict, and expreſs the difference of ſex, not by different terminations, nor by different particles, but different words; as boar and ſow, boy and girl, brother and ſiſter, &c. — though ſometimes the feminine is formed by varying the termination of the male into *eſs*; as in abbot, abbeſs, &c.

FEMUR, OS FEMORIS, in anatomy. See there, n° 58.

FEN, a place overflowed with water, or abounding with bogs. See BOG and DRAINING.

Fens are either made up of a congeries of bogs; or conſiſt of a multitude of pools or lakes, with dry ſpots of land intermixed, like ſo many little iſlands.

Several ſtatutes have been made in England for the draining of fens, chiefly in Kent, Cambridgeſhire, Bedfordſhire, and Lincolnſhire; and by a late act, 11 Geo. II. commiſſioners ſhall be appointed for the effectually draining and preſerving of the fens in the iſle of Ely, who are authoriſed to make drains, dams, and proper works thereon; and they may charge the land-holders therein with a yearly acre-tax, and, in default of payment, ſell the defender's lands.

The wet grounds called *fens* in Lincolnſhire and elſewhere in England, bring many advantages to the inhabitants of thoſe counties. Fowl and fiſh are very plentiful in them. The pike and eels are large and eaſily caught, but they are uſually coarſe. The duck, mallard and teal, are in ſuch plenty as is ſcarce to be conceived. They are taken by DECOYS in prodigious flocks at a time. They ſend theſe fowl from Lincolnſhire to London, twice a-week, on horſeback, from Michaelmas to Lady-day; and one decoy will furniſh 20 dozen, or more, twice a-week, for the whole ſeaſon in this manner. The decoy-men contract with the people, who bring them to London at a certain rate, and they are obliged to take off their hands the whole number that is catched. Two teal are uſually reckoned equal to one duck; and ſix ducks and 12 teal are accounted a dozen of wild-fowl; and the uſual market price is about 9s. for ſuch a dozen. About midſummer, during the moulting ſeaſon, a great number alſo are deſtroyed by the people in the neighbourhoods. The poor birds at this ſeaſon are neither able to ſwim nor fly well; and the people going in with boats among the reeds where they lie, knock them down with long poles. A little before Michaelmas, vaſt flights of theſe birds arrive at the decoys from other places; they ſoon grow fat in them, and continue there a prey to the maſters or owners, as long as the decoys are unfrozen; but, when they are iced over, they fly away again, and go to the neighbouring ſeas for food.

The fens alſo abound in a ſort of herbage that is very nouriſhing to cattle. Sheep and horſes always grow fat upon it. Theſe fens are common, and the owners of cattle mark them that they may be known. It is remarkable, that though all is open, the cattle uſed to one particular ſpot of ground ſeldom leave it, but the owner may always find them in or near the ſame place. The fens have many large and deep drains. In theſe the pike and eel grow to a vaſt ſize: and they are full of geeſe which feed on the graſs; but theſe eat rank and muddy, and may even be ſmelt as ſoon as a perſon comes into the room where they are roaſting. But the people have another very great advantage from theſe birds beſides the eating of them, namely, their feathers and quills; and the produce of theſe is ſo great, that the cuſtom-houſe-books in the town of Boſton ſhow, that there are frequently ſent away in one year 300 bags of feathers, each containing a hundred and a half weight. Each pound of feathers brings in the owner twopence; and it may be thought ſtrange by people unacquainted with theſe things, but it is a certain truth, that the owners pull them five or ſix times a year for the feathers, and three times for the quills. Each pulling comes to about a pound, and many people have 1000 geeſe at a time or more. They are kept at no charge except in deep ſnowy weather, when they are obliged to feed them with corn.

Oats alſo grow very well in many of the fen countries, and in good ſeaſons bring great increaſe and advantage to the owners. There is alſo another vegetable of great profit to them. This is the *rapum ſilveſtre*; the ſeed of which they call *cole-ſeed*; and they make an oil from it of great uſe in trade. They grind the ſeed between two large ſtones, the one ſtanding perpendicularly on the other. The ſtones are made of a ſort of black marble, and are brought from Germany. They ſometimes turn them by ſails, and ſometimes by the drains which carry off the water from the fen lands.

The fens lying low, and being of a vaſt extent, are very ſubject to be overflowed by waters from the neighbouring high countries: and though great care and expence is uſed to keep them dry, they are often like a ſea ; and the ſheep are obliged to be carried off in boats and the people to live in their upper rooms, and to be ſupplied with proviſions alſo with boats.

FENCE, in gardening and huſbandry, a hedge, wall, ditch, bank, or other incloſure, made round gardens, fields, woods, &c.

In hot climates, where they have not occaſion for walls to ripen their fruit, their gardens lie open, where they can have a water-fence, and proſpects ; or elſe they bound their gardens with groves, in which are fountains, walks, &c. which are much more pleaſing to the ſight than a dead wall : but, in colder climates, we are obliged to have walls to ſhelter and ripen our fruit, although they take away much from the pleaſant proſpect of the garden. Brick walls are accounted the beſt and warmeſt for fruit : and theſe walls, being built pannelwiſe, with pillars at equal diſtances, will ſave a great deal of charge, in that the walls may be built thinner than if they were made plain without theſe pannels, for then it would be neceſſary to build them thicker every where ; and, beſides, theſe pannels make the walls look the handſomer. Stone-walls, however, on account of their durability, are to be preferred to thoſe of brick, eſpecially thoſe of ſquare hewn ſtones. Thoſe that are made of rough ſtones, though they are very dry and warm, yet by reaſon of their unevenneſs, are inconvenient to nail up trees to, except pieces of timber be laid in them here and there for that purpoſe.

But in large gardens, it is better to have the proſpect open to the pleaſure-garden ; which ſhould be ſurrounded with a foſſe, that from the garden the adjacent country may be viewed. But this muſt depend on the ſituation of the place : for if the proſpect from the garden is not good, it had better be ſhut out from the ſight than be open. As alſo, when a garden lies near a populous town, and the adjoining grounds are open to the inhabitants : if the garden is open, there will be no walking there in good weather, without being expoſed to the view of all paſſengers, which is very diſagreeable.

Miller's Gardener's Dictionary.

Where the foſſes are made round a garden which is ſituated in a park, they are extremely proper ; becauſe hereby the proſpect of the park will be obtained in the garden, which renders thoſe gardens much more agreeable than thoſe that are confined.—In the making theſe foſſes there have been many inventions ; but upon the whole, none ſeem preferable to thoſe which have an upright wall next the garden, which (where the ſoil will admit of a deep trench) ſhould be five or ſix feet high ; and, from the foot of this wall, the ground on the outſide ſhould riſe with a gradual, eaſy ſlope, to the diſtance of 18 or 20 feet ; and where it can be allowed, if it ſlopes much farther it will be eaſier, and leſs perceptible as a ditch, to the eye, when viewed at a diſtance ; but, if the ground is naturally wet, ſo as not to admit of a deep foſſe, then, in order to make a fence againſt cattle, if the wall be four feet high, and ſlight poſts of three feet high are placed juſt behind the wall, with a ſmall chain carried on from poſt to poſt, no cattle or deer will ever attempt to jump againſt it ; therefore, it will be a ſecure fence againſt them ; and if theſe are painted green, they will not be diſcerned at a diſtance, and at the ſame time the chain will ſecure perſons walking in the garden from tumbling over.

In places where there are no good proſpects to be obtained from a garden, it is common to make the incloſure of park-paling ; which, if well performed, will laſt many years, and has a much better appearance than a wall : and this pale may be hid from the ſight within, by plantations of ſhrubs and evergreens ; or there may be a quick-hedge planted within the pale, which may be trained up, ſo as to be an excellent fence by the time the pales begin to decay.

Fences round parks are generally of paling ; which if well made of winter-fallen oak, will laſt many years. But a principal thing to be obſerved, in making theſe pales, is not to make them too heavy ; for, when they are ſo, their own weight will cauſe them to decay : therefore, the pales ſhould be cleft thin ; and the rails ſhould be cut triangular, to prevent the wet lodging upon them ; and the poſts ſhould be good, and not placed too far aſunder. If theſe things are obſerved, one of theſe pales will laſt, with a little care, upwards of forty years very well. The common way of making theſe fences is, to have every other pale nine or ten inches above the intermediate ones ; ſo that the fence may be ſix feet and a half high, which is enough for fallow deer ; but, where there are red deer, the fence ſhould be one foot higher, otherwiſe they will leap over.

Some incloſe their parks with brick walls ; and in countries where ſtone is cheap, the walls are built with this material ; ſome with, and others without mortar.

A kitchen-garden, if rightly contrived, will contain walling enough to afford a ſupply of ſuch fruits as require the aſſiſtance of walls, for any family ; and this garden, being ſituated on one ſide, and quite out of ſight of the houſe, may be ſurrounded with walls which will ſcreen the kitchen garden from the ſight of perſons in the pleaſure-garden ; and, being locked up, the fruit will be much better preſerved than it can be in the public garden ; and the having too great a quantity of walling is often the occaſion that ſo many ill-managed trees are frequently to be ſeen in large gardens.

The height of garden walls ſhould be 12 feet, which is a moderate proportion ; and if the ſoil be good, it may in time be well furniſhed with bearing-wood in every part, eſpecially that part planted with pears, notwithſtanding of the branches being trained horizontally from the bottom of the walls.

With regard to the more common kinds of fences, Mr Anderſon gives the following directions, in his Eſſays on Agriculture, &c. "The fences that are moſt univerſally employed, are either ſtone-dikes or hedges (A). Dikes, if well built, as effectually preſerve a field from the intruſion of domeſtic animals, as any other kind of fence whatever ; but they afford little

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(A) *Dike* is a term employed to denote any kind of wall reared for the purpoſe of incloſing a field and nothing elſe.

warmth or ſhelter to the field: whereas hedges, if good, anſwer both theſe purpoſes equally well. But the moſt material diſtinction between dikes and hedges is, that dikes are in their higheſt degree of perfection as ſoon as they are reared, and from that moment begin to tend towards decay; ſo that the perſon who builds this kind of fence immediately receives the full benefit thereof; whereas hedges, being at firſt weak and tender, ſtand in need of attention and care, and do not become a fence for ſeveral years after they are planted; and, as they continue to increaſe in ſtrength and gradually acquire a higher and higher degree of perfection, it is long before they begin to fall towards decay; ſo that they are, in general, infinitely more durable than dikes, although they are longer of becoming of uſe to the perſon who plants them. Which of theſe two kinds of fences may, upon the whole, be moſt eligible, muſt, in general, be determined by the circumſtances and views of the poſſeſſor of the ground to be incloſed. If he is a tennant who has a ſhort leaſe, without a proſpect of getting it renewed; or, if he has immediate occaſion for a complete fence; it will be, in general, moſt prudent in him to make choice of dikes, if the materials for rearing theſe are at hand: but, if there is any probability that his poſterity may reap any advantage from theſe incloſures, it will be almoſt always more for his advantage to make choice of hedges.

"A dike built of freeſtone and lime will be almoſt as durable as a hedge; although, in general, it will neither be ſo cheap nor agreeable. But dry-ſtone dikes, unleſs built of the fineſt quarried ſtone, are of ſuch a periſhable nature, as to be hardly ever worth the expence of rearing; and never, excepting where the field that you would wiſh to incloſe has plenty of ſtones upon its ſurface, which you are under a neceſſity of carrying away before the field can be improved. In this ſituation a man may, in ſome meaſure be excuſed, if he ſhould be tempted to put them into dikes; becauſe the carriage of theſe ſtones may be ſaid to coſt him nothing: and he may, perhaps, be at ſome loſs how to diſpoſe of them in any other manner. But, in all other circumſtances, it is very bad economy to rear fences of this kind, as feal dikes can always be built at one-fourth of the expence that theſe would coſt—will anſwer all purpoſes equally well; and, if carefully built, will be kept in repair for any number of years at as ſmall an expence as they could be.

"The want of durability generally complained of in theſe dikes is owing to their bad conſtruction. The greateſt part of them are made of a conſiderable thickneſs, with a ditch on each ſide; the heart of the dike being made up with the earth that is taken from theſe ditches; and only a thin wall, on each ſide, is built of ſolid feal from top to bottom; the conſequence of which is, that as the looſe earth that is thrown into the middle of the dike ſubſides much more than the feal on each ſide, the top of the dike ſinks down; and, of courſe, the two ſide-walls are preſſed too much upon the inſide, ſo as to bilge (ſwell) out about the middle, and quickly crumble down to duſt. To avoid this inconvenience, I have always choſen to build my dikes of this ſort thinner than uſual: they being only three feet and an half thick at the bottom: one foot, or a very little more, at top; and five feet high; taking care to have them built in ſuch a manner, as that every ſod (ſeal) from top to bottom binds the joinings of the others below it, with as much accuracy as the bricks in a well-built wall. The uppermoſt courſe of feal is cut a little longer than thoſe that are immediately below it, and placed with the graſſy ſide uppermoſt, ſo as to project a little on each ſide; which not only helps to throw the water a little off the dike, but alſo to prevent ſheep or cattle from attempting to jump over it ſo readily as they otherwiſe might do. At the foot of the dike, on each ſide, is dug a ſmall ditch, about a foot and a half or two feet deep; leaving a ledget of a few inches broad on each ſide, that the dike may not be undermined by the crumbling down of the looſe earth into the ditch. Theſe ditches not only help to give the dike an additional height, and keep its foundation dry; but are alſo of uſe to prevent cattle from coming cloſe to it and rubbing upon it, or tearing it down with their horns which they are very apt to do if this precaution be omittted. The earth that is taken out of the ditches may be thrown outwards into the place that was occupied by the feal that has been taken to build the dike; and if the field is in graſs, a few ſeeds may be ſowed upon it, and it will ſoon be covered as well as the reſt of the field.

"By having the joints bound in every direction, the fabric is rendered much firmer than it could be by any irregular manner of working, while it is at the ſame time more eaſily reared. If the ground is ſoft, and the feal riſe well, I get a fence of this kind done for one penny halfpenny *per* yard; but, if it is not good to work, a little more than that muſt be allowed. As to the time that a fence of this kind may ſtand without needing any repair, I cannot ſpeak with certainty, as it is not long ſince I fell into this method of building them. The oldeſt has juſt now ſtood ten years, and ſeems to be nearly as firm as when firſt built. I have ſeen ſome walls of poor cottages which have been built ſomewhat after this manner, that have been good after ſtanding 40 or 50 years: but their durability depends greatly upon the nature of the feal of which they are formed. The beſt is that which is taken from poor ground of a ſpongy quality, which is generally covered with a ſtrong ſward of coarſe benty graſs. And, in ſituations where this can be had, I would have no heſitation in recommending this as the cheapeſt and beſt temporary fence that could be reared.

"The greateſt inconvenience that attends this ſpecies of fence, is the danger it runs of being torn down by the horns, or waſted away by the rubbing, of cattle upon it; which they will ſometimes do notwithſtanding of the ditches. This may be effectually prevented by planting a row of ſweet-briar *(eglantine)* plants between the firſt and ſecond courſe of feal when the dike is built, which will not fail to grow with luxuriance and in a ſhort time defend the dike from every attack of this kind. But if ſheep are to be kept in the incloſures, this plant ought not, on any account, to be employed; for, as that animal naturally flies to the fences for ſhelter in ſtormy weather, the prickles of the ſtraggling branches of the briar will catch hold of to the wool, and tear it off in great quantities, to the great detriment of the flock and loſs of the proprietor. In theſe caſes, if the poſſeſſor of the ground is not afraid of the bad conſequences that may be dreaded from the ſpreading of whins (*furze*), it would be much better to ſcatter a few of the ſeeds of this plant along the ledget at the foot of the dike, which would quickly become a preſervative for it, and be otherwiſe of uſe as a green food for his ſheep during the winter ſeaſon. But, before he ventures to ſow this plant, let him remember, that where it is once eſtabliſhed, it will hardly fail to ſpread through the adjoining fields, and can hardly be ever afterwards thoroughly rooted out.

“ I have often imagined that this kind of fence might be greatly improved both in beauty and ſtrength, by planting a row of ivy plants beneath the firſt courſe of feal in building the dike; which would, in a ſhort time, climb up the ſides of the dike and cover the whole with a cloſe and beautiful network of woody fibres; covered with leaves of the moſt beautiful verdure; which would tend to preſerve the dike from being eat away by froſt, and other viciſſitudes of weather. And when it is arrived at the top, it would there ſend out a number of ſtrong woody branches, forming a ſort of hedge, that would afford ſome ſhelter to the fields, and break the force of the wind conſiderably; but as I never have yet had an opportunity of trying the experiment, I only here offer it as a probable conjecture. I have ſeen a garden-wall that had been built of ſtone and clay, ornamented and ſtrengthened in this way. I have had the experience of ivy growing well upon a dry ſtone-dike: and have likewiſe ſeen it growing up the walls, and covering whole cottages built of feal; which have by this means been preſerved entire, long after the walls that had been naked have fallen to decay. But, not having had plants of this kind at hand, I have not had an opportunity of trying it in the manner propoſed; although, I think, there is the greateſt reaſon to hope for ſucceſs.

“ Whins (*furze*) have been often employed as a fence when ſowed upon the top of a bank. They are attended with the convenience of coming very quickly to their perfection, and of growing upon a ſoil on which few other plants could be made to thrive: but, in the way that they are commonly employed, they are neither a ſtrong nor a laſting fence. The firſt of theſe defects may, in ſome meaſure, be removed, by making the bank upon which they are ſowed (for they never ſhould be tranſplanted) of a conſiderable breadth; in order that the largeneſs of the aggregate body, conſidered as one maſs, may in ſome meaſure make up for the want of ſtrength in each individual plant. With this view, a bank may be raiſed of five or ſix feet in breadth at the top, with a large ditch on each ſide of it; raiſing the bank as high as the earth taken from the ditches will permit; the ſurface of which ſhould be ſowed pretty thick with whin-ſeeds. Theſe will come up very quickly; and in two or three years will form a barrier that few animals will attempt to break thro', and will continue in that ſtate of perfection for ſome years. But the greateſt objection to this plant as a fence is, that, as it advances in ſize, the old prickles always die away; there being never more of theſe alive at any time upon the plant, than thoſe that have been the produce of the year immediately preceding: and theſe thus gradually falling away, leave the ſtems naked below as they advance in height; ſo that it very ſoon becomes an exceeding poor and unſightly fence; the ſtems being entirely bare, and ſo ſlender withal as not to be able to make a ſufficient reſiſtance to almoſt any animal whatever. To remedy this great defect, either of the two following methods may be adopted. The firſt is, to take care to keep the bank always ſtored with young plants; never allowing them to grow to ſuch a height as to become bare below: and it was principally to admit of this, without loſing at any time the uſe of the fence, that I have adviſed the bank to be made of ſuch an unuſual breadth. For if one ſide of the hedge be cut quite cloſe to the bank, when it is only two or three years old, the other half will remain as a fence till that ſide become ſtrong again; and then the oppoſite ſide may be cut down in its turn; and ſo on alternately as long as you may incline: by which means the bank will always have a ſtrong hedge upon it without ever becoming naked at the root. And as this plant, when bruiſed, is one of the moſt valuable kinds of winter-food yet known for all kinds of domeſtic animals*, the young tops may be carried home and employed for that purpoſe by the farmer; which will abundantly compenſate for the trouble of cutting, and the waſte of ground that is occaſioned by the breadth of the bank.

“ The other method of preſerving a hedge of whins from turning open below, can only be practiſed where ſheep are kept; but may be there employed with great propriety. In this caſe it will be proper to ſow the ſeeds upon a conical bank of earth, ſhoved up from the ſurface of the ground on each ſide without any ditches. If this is preſerved from the ſheep for two or three years at firſt, they may then be allowed free acceſs to it; and, as they can get up cloſe to the foot of the bank upon each ſide, if they have been accuſtomed to this kind of food, they will eat up all the young ſhoots that are within their reach, which will occaſion them to ſend out a great many lateral ſhoots; and theſe being continually browſed upon, ſoon become as cloſe as could be deſired, and are then in no ſort of danger of becoming naked at the root, although the middle part ſhould advance to a conſiderable height.

“ The fences hitherto mentioned are only intended to preſerve fields from the intruſion of cattle; but, on ſome occaſions, it is neceſſary to have a fence that would even reſiſt the efforts of men to break through it: as around bleaching-fields, orchards, &c.; the want of which often ſubjects the proprietor of ſuch fields to very diſagreeable accidents. And, as ſuch a fence might, on ſome occaſions, be procured at no great expence or trouble, it were to be wiſhed that the method of doing this were more generally known than it is at preſent. To effectuate this, it is neceſſary to begin by trenching up or ploughing a large belt all around the field you mean to incloſe, of 40 or 50 feet or more in breadth, if you find it convenient: the outer edge of which ſhould be incloſed by a good dike, or a ditch and hedge. This belt ſhould be kept in culture one year, and well manured, if your ſituation will admit of it; and laid up before winter in ſuch a manner that no water may be allowed to lodge upon it; and planted in the winter-time all over with plants of eglantine ſo thick as not to be above two feet from one another; and between theſe put a good number of young birch plants not above two years old, interſperſed with hazels, oak, aſh, rawn (wild ſervice), and other trees that you think will thrive upon your ſoil; together with thorns, hollies, brambles, and wood-bine (honey-ſuckle); and having then fenced it from cattle, and kept down the weeds that may riſe upon its ſurface by the hoe, as long as you can conveniently get acceſs into it, leave it afterwards to nature. If this is done, and your ſoil be not extremely bad, the belt in a very few years will be entirely filled with a cloſe buſh of trees, ſo intermixed with the bending branches of the eglantine, and bound together by the trailing ſhoots of the bramble and wood bine, that no animal above the ſize of a cat could penetrate; eſpecially when it is of ſuch a depth as I have recommended.

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* See *Agriculture*, n° 47.

" The firſt hint that I got for a fence of this kind was from a ſmall thicket of bruſhwood that I had planted for ornament, pretty much in the manner above deſcribed; which in a ſhort time became ſo much interwoven with the ſweet-briar, that it was impoſſible to find any acceſs into it. But as all kinds of trees and ſhrubs, if planted very cloſe upon one another, become naked at the root when they arrive at any conſiderable ſize, care ſhould be taken to prevent it from ever coming to that ſtate, by cutting it down whenever it becomes in danger of being open at the root. And as it would be improper ever to leave the field entirely defenceleſs, it is a great advantage to have the belt as broad as it conveniently may be, ſo that the one half of it may be a ſufficient fence; by which means, we will have it in our power to cut down the inſide and the outſide of the belt alternately, ſo as ſtill to keep the thicket young, and never to want at any time a ſufficient fence; and the bruſh-wood that this afforded at each cutting would, in almoſt every ſituation, yield ſuch a revenue as would do much more than indemnify the proprietor for the rent of the ground that was occupied by this fence. And if the field was in ſuch a ſituation as required ſhelter, ſome trees might be allowed to grow to their full ſize about the middle, without any inconvenience, if the belt were of a ſufficient breadth.

" There is one other ſpecies of fencing as uſeful as any of thoſe already mentioned, which is in general much leſs underſtood, and more difficult to execute properly, that deſerves here to be taken notice of; *viz.* the method of ſecuring the banks of rivers from being waſhed away by the violence of the ſtream, and of preventing the damages that may otherwiſe be occaſioned by the ſwelling of the waters.

" It frequently happens that, when a river runs in a bed of rich vegetable mould, the leaſt accident that may chance to divert the ſtream towards any particular part of the bank, cauſes it to ſweep away large tracts of fine ground, to the very great detriment of the proprietor, as well as the public; as this fine mould is uſually carried to the ſea, and the place that the water leaves to occupy the new bed that it thus forms for itſelf is generally of a much worſe quality; conſiſting chiefly of ſtones, ſand, and gravel. In ſome caſes, where the whole force of the current is quite cloſe to the bank, and the materials neceſſary for fencing it are not to be found, it may perhaps be impoſſible or very difficult totally to prevent this evil; but, for the moſt part, it admits of a cure that can be obtained at a pretty moderate expence.

" Theſe ravages are always greateſt where the bank riſes perpendicularly to a pretty conſiderable height above the ordinary ſurface of the water, and never at thoſe places where the banks ſhelve down gradually towards the water's edge: for, when the river is ſwelled to a great height by rains, and runs with a force and rapidity greater than uſual, it ſtrikes violently againſt theſe perpendicular banks that directly oppoſe its courſe, which being compoſed of earth quite bare and uncovered, are eaſily ſoftened by the water, and quickly waſhed away; ſo that the upper part of the bank being thus undermined, falls by its own weight into the river, and is carried off in prodigious quantities: whereas at thoſe parts of the bank that ſhelve gradually downwards to the water's edge, when the river riſes to any conſiderable height, it gently glides along its ſurface; which being defended by the matted roots of the graſs with which it is covered, ſcarcely ſuſtains any damage at all; and is nearly the ſame after the water has retired within its banks as before the inundation. Theſe facts, which no one who has beſtowed the leaſt attention to this ſubject can fail to have obſerved, clearly point out, that the firſt and moſt neceſſary ſtep towards a cure, is to level down the edge of the bank that is next to the water, ſo as to make it ſlope gradually down towards the river. If the bank is very high, and you have no other particular uſe for the earth that muſt be taken from it, the eaſieſt method of diſpoſing of it, will be to throw it into the river: but, in whatever manner you may diſpoſe of the earth, the ſlope of the bank muſt be continued until the inner edge of it is as low as the ſurface of the water at the drieſt time of the year, and be made to aſcend gradually upwards from the water with an eaſy ſlope, till it comes to the level of the ground, or at leaſt riſes to ſuch a height as that the water never exceeds. This operation ought to be performed as early in ſummer as poſſible, and ſhould be either immediately covered with turf, pared from the ſurface of ſome field that has a very ſtrong ſward upon it, taking care to lay theſe in ſuch a manner as to be in as little danger as poſſible of being waſhed away by any accidental flood that might happen before they had grown together; or, if the turf of this kind cannot be eaſily had, it ſhould be ſowed very thick with the ſeeds of ſome ſmall matt-rooted graſs, that ſhould be kept in readineſs for this purpoſe (c).

" If the ſtream has not been extremely rapid at the foot of the bank, ſome of the earth that was thrown into the water will be allowed to ſubſide to the bottom, and will there form a bank of looſe ſoft earth, which will be of great uſe afterwards in preventing the face of the bank under water from being waſhed away; but, in order to ſecure this bulwark effectually for the future, the ſurface of this ſoft earth ought to be inſtantly ſtuck full of the roots of bog-reeds, flags, water-ſpiderwort, ruſhes, and other matt-rooted aquatic plants; which, if allowed to remain till they have once ſtruck root, will afterwards form a barrier that nothing will ever be able to deſtroy. But, if the ſtream be too rapid to admit of this, and the bank of ſoft earth is much deeper than the ſurface of the water, it will be of uſe to fill up the breaſt of the bank with looſe ſtones careleſsly

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(c) The creeping meadow-graſs, *poa repens*, is a proper graſs for this purpoſe.

Fence, Fencing.

careleſsly thrown in, till they riſe near the ſurface of the water which would moſt effectually ſecure it againſt any future encroachments, if the bank is ſloped away above.

“ If it ſhould ſo happen that ſtones cannot be eaſily got for this purpoſe, the only reſource which in this caſe remains, is to dig the bank ſo low, that at the undermoſt edge, it may be always below the ſurface of the water, and carry it out in this way for a conſiderable diſtance, and then ſtick the whole ſurface that is below the water full of matt-rooted aquatic plants; which will in a great meaſure, if not entirely, defend it from any future encroachments. This bank ought to continue to ſhelve downwards even where it was below water, and thoſe aquatics that will grow in the greateſt depth of water be planted on the innermoſt brink, and the others behind them. The water ſpiderwort will grow in four feet depth of water, and the roots of the common yellow-flowered water-iris forms ſuch a ſtrong and compact covering upon the ſurface of the ſoil on which it grows, as would defend it from being affected by the water almoſt as well as if it were a rock: it is likewiſe an advantage attending this plant, that it grows upon a firm bottom, and chiefly delights in running water.

“ If the ſtratum of ſoft earth is not ſo deep as to reach to the ſurface of the water, and lies upon a ſtratum of rock or hard gravel, there will be no occaſion for throwing in ſtones of any kind. But, as it is difficult to unite the vegetable mould to any of theſe ſtrata, there will always be ſome danger of its ſeparating from theſe in violent inundations; and if the water once gets an entry, it will not fail to grow larger and larger by every future inundation. To prevent this inconvenience, it will be neceſſary, after you have ſloped the earth away till you reach the gravel or rock, to cover the place where the edge of the earth joins the inferior ſtratum with a good many ſmall ſtones, if they can be found; ſowing between them the ſeeds of any kind of plants that you think are moſt likely to thrive, which have ſtrong matted roots with as ſmall and flexible tops as poſſible. You will eaſily obſerve, that from the impoſſibility of ever making earth adhere firmly to ſtone of any kind, it muſt always be an improper practice to face the banks of a river to a certain height with ſtone which is coped at top with earth.”

For the moſt proper methods of raiſing hedges of different kinds, ſee Hedge.

Fence-Month, the month wherein deer begin to fawn, during which it is unlawful to hunt in the foreſt.

It commences 15 days before mid-ſummer, and ends 15 days after it. This month, by ancient foreſters, is called *defence-month*.

FENCING, the art of making a proper uſe of the ſword, as well for attacking an enemy as for defending one's ſelf.

This art is acquired by practiſing with foils, called in Latin *rudes*; whence fencing is alſo denominated *gladiatura rudiaria*.—It is one of the exerciſes learnt in the academies (ſee Exercise and Academy); and is an accompliſhment both agreeable and uſeful:—Agreeable, as it affords gentlemen a noble and diſtinguiſhed amuſement:—Uſeful, as it forms their body; and furniſhes them with the faculty of defence, whether it be of their honour or their life, when the one or the other is attacked by thoſe turbulent and dangerous perſons whoſe correction is of ſervice to ſociety in general.

Fencing, Fenelon.

Pyrard aſſures us, that the art of fencing is ſo highly eſteemed in the Eaſt-Indies, that none but princes and noblemen are allowed to teach it They wear a badge or cognizance on their right arms, called in their language *eſaru*; which is put on with great ceremony, like the badges of our orders of knighthood, by the kings themſelves.

Fencing is divided into two parts, *ſimple* and *compound*.

Simple is that performed directly and nimbly, on the ſame line; and is either offenſive or defenſive.—The principal object of the firſt is, whatever may be attempted, in puſhing or making paſſes, from this or that point, to the moſt uncovered part of the enemy. The ſecond conſiſts in parrying and repelling the thruſts aimed by the enemy.

The *compound* includes all the poſſible arts and inventions to deceive the enemy, and make him leave that part we have a deſign on bare and unguarded, upon finding we cannot come at it by force, nor by the agility of the ſimple play. The principal means here of are, on the offenſive ſide, feints, appeals, claſhings, and entanglings of ſwords, half-thruſts, &c.; and, on the defenſive, to puſh in parrying. Of all which a detail would be here uſeleſs, as they are only to be underſtood and acquired from perſonal inſtructions conjoined with practice.

FENELON (Francis de Salignac de la Motte), was of an ancient and illuſtrious, family, and born at the caſtle of Fenelon in Perigord in 1651. In 1689, he was appointed tutor to the dukes of Burgundy and Anjou; and in 1695 was conſecrated archbiſhop of Cambray. After this preferment, a ſtorm roſe againſt him, that obliged him to leave the court for ever, occaſioned by his performance entitled, *An Explication of the Maxims of the Saints concerning the Interior Life*; in which he was ſuppoſed to favour the extravagant notions of Madam Guyon, and the principles of Quietiſm. A controverſy on this occaſion was for ſome time carried on between him and M. Boſſuet, biſhop of Meaux: which terminated in an appeal to the pope; when his holineſs condemned the archbiſhop's book, by a brief dated March 12th, 1699. Some friends indeed pretend that there was more of court-policy than religious zeal in this affair: but be this as it may, the archbiſhop ſubmitted patiently to this determination; and, retiring to his dioceſe of Cambray, acquitted himſelf punctually in all the duties of his ſtation, and led a moſt exemplary life. The work that gained him the greateſt reputation, and which will render his memory immortal, is his *Adventures of Telemachus*; the ſtyle of which is natural, the fictions well contrived, the moral ſublime, and the political maxims tending all to the happineſs of mankind. Hence it is thought, as the printing of this work was ſtopped at Paris, that the prelate's hereſy was in politics inſtead of religion; and though his diſgrace was prior to this work, he had, while he was tutor to the young princes, taught them the ſame principles aſſerted and exemplified in Telemachus. Fenelon died in 1715; and a collection of all his religious works was afterwards printed at Roterdam, under the care of the marquis de Fenelon his grand-nephew, when ambaſſador to the States-General.

FENNFL, in botany. See ANETHUM.

FENTON (Sir Geoffrey), privy-counſellor and ſecretary in Ireland during the reigns of queen Elizabeth and king James I. is well known for his tranſlation of *Guicciardin's Hiſtory of the Wars of Italy*, dedicated to queen Elizabeth in 1579. He died at Dublin in 1608; after having married his daughter to Mr Boyle, afterward the great Earl of Corke.

FENTON (Elijah), deſcended from an ancient family was born at Shelton near Newcaſtle, but in what year is uncertain. He was the youngeſt of 12 children, and was intended for the miniſtry; but embracing principles contrary to the government, while at Cambridge, he became diſqualified for entering into holy orders. After he quitted the univerſity, he was ſecretary to the earl of Orrery; but ſeems to have ſpent the moſt of his life amongſt his friends and relations, and uſed to pay an annual viſit to his elder brother, who enjoyed an eſtate of L. 1000 a-year. He was a man of great tenderneſs and humanity, enjoyed the faireſt reputation, and was much eſteemed by Mr Pope; who when he died in 1730, paid him the tribute of a very elegant epitaph. He publiſhed a volume of poems in the year 1717; and in 1723 was acted his tragedy of Mariamne, built upon her ſtory collected from Joſephus in the third volume of the Spectator.

FENUGREEK. See TRIGONELLA.

FEOD, or FEUD, is defined to be a right which a vaſſal hath in lands or ſome immoveable thing of his lord's, to uſe the ſame, and take the profits thereof hereditarily, rendering unto the lord ſuch feodal duties and ſervices as belong to military tenure, &c. and the property of the ſoil always remaining to the lord.

FEODAL, of or belonging to a FEUD or FEE.

FEODAL Syſtem, the conſtitution of FIEFS or FEUDS.

About 12 centuries ago, this ſyſtem was ſo univerſally received in Europe, that Sir Henry Spelman calls it *the law of nations in our weſtern world*. Hence it deſerves our attention in a particular manner; a knowledge of the different feuds being indiſpenſably requiſite for a proper underſtanding either of the civil government of our own country, or the laws by which its landed property is regulated.

1 Origin of feuds.

The military policy of the Celtic or northern nations, known by the names of *Goths*, *Vandals*, *Franks*, *Huns*, and *Lombards*, furniſhed the original conſtitution or ſyſtem of feuds. Theſe people pouring out in vaſt multitudes from the ſame *officina gentium* or "ſtorehouſe of nations," over-ran all the European countries on the declenſion of the Roman empire. They brought the feudal ſyſtem along with them from the countries out of which they emigrated; and, ſuppoſing it to be the moſt proper method of ſecuring their new conqueſts, they introduced it into their more ſoutherly colonies.

According to this ſyſtem, the victorious general allotted conſiderable tracks of land to his principal officers; while they, in like manner, divided their poſſeſſions among the inferior officers, and even thoſe common ſoldiers who were thought to be the moſt deſerving. Allotments of this kind were named *feoda*, *fiefs*, *fees*, or *feuds*, from a combination of words, in the language or theſe barbarians, ſignifying a reward or ſtipend beſtowed on certain conditions (A). The condition upon which theſe rewards were given was, that the poſſeſſors ſhould faithfully ſerve the perſon from whom they were received, both at home and abroad, in the military way. To this they engaged themſelves by a *juramentum fidelitatis*, or oath of fealty*; in the event of a breach of which, either by not performing the ſervice agreed upon, by deſerting their lord in time of battle, &c. the lands were to return to their original poſſeſſor.

* See the Article Feodal *Tenure.*

2 General nature of the feodal aſſociation.

Thus the poſſeſſors of feodal allotments became intereſted in the defence of them; and not only the receivers, but thoſe who gave them, were equally and mutually bound to defend their poſſeſſions, none of them being able to pretend any right but that of conqueſt. For this purpoſe, government and ſubordination were abſolutely neceſſary; it being impoſſible to conduct any ſyſtem of defence where every thing was tumultuous and irregular. Every perſon, therefore, who was a feudatory, *i. e.* who had received lands, was bound to do every thing in his power to defend the lord of his fee; while, on the other hand, the latter was no leſs ſubordinate to his immediate ſuperior; and ſo on to the prince himſelf. In like manner a reciprocal bond of defence exiſted down from the prince to the loweſt feodiſts.

Such were the foundations on which the feodal ſyſtem was properly eſtabliſhed; and the natural conſequence was, a military ſubjection throughout the whole community. The prince could always collect an army of feudatories ready to defend not only the kingdom in general, but the particular poſſeſſions of each perſon; and the propriety of this conſtitution was ſoon apparent in the ſtrength which theſe newly erected kingdoms acquired, and the valour with which their conqueſts were defended.

3 Of allodiality.

Beſides theſe feodal grants, however, which were held only on the terms of military ſervice abovementioned, there were others called *allodial*, which were given upon more enlarged principles. To theſe every free man had a title; and could not only claim his territory as well as the reſt, but diſpoſe of it at his pleaſure

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(A) We are informed by Pontopiddan, that ODH in theſe northern languages is the ſame with *proprietas*, and ALL with *totum* in the Latin. Hence, among the northern nations, he tells us, that ODHALT ſignifies *right:* and hence we may conjecture, that the UDAL right in Finland is derived*. By tranſpoſing theſe two northern ſyllables, we form the word ALLODH; whence we have the etymology of the *allodium* or *abſolute* property claimed by the holders of fiefs or fends; and by combining ODH, ſignifying "property," with the word *fee*, ſignifying, "a conditional ſtipend or reward," we have the word FEODH, ſignifying, "a property given by way of ſtipend or reward upon a certain condition."

* See *Macdowell's Indit.* part 2.

pleaſure (B); and this freedom was denominated *allodiality*. Theſe allodials, however, were not exempted from military ſervice. A part of their freedom conſiſted in liberty to go to the wars; for this, in the barbarous times we ſpeak of, was the only way to acquire any degree of renown. Only the ſlaves were deſtined to follow the arts of peace; while every free perſon was not only at liberty to defend his country, but under an obligation to do it in caſe of any urgent neceſſity.

4 Feodal and national militia.

Thus there was a feodal and a national militia. The free people only were allowed to poſſeſs property; the *feudal vaſſals* conſtituted the army, properly ſo called; while the national militia was compoſed of the allodial proprietors. This allodiality, however, was not confinded to landed property, but included likewiſe moveable eſtates or money; ſo that proprietors of the latter kind were obliged alſo in times of danger to bear arms and appear in the field.

5 Different ſituations of the feodal and of the allodial proprietor.

Between the feodal and allodial proprietors, however, there was this farther difference, that the latter had no concern with any private quarrels which might take place among the lords themſelves; ſo that they were never obliged to appear in the field unleſs when called forth by the ſovereign againſt the enemies of the nation at large. This circumſtance we might ſuppoſe to be an advantage, but it ultimately operated otherwiſe; becoming the means of changing the allodial right into a feodal tenure. For ſome time the holders of fiefs had an eminent advantage over the allodial proprietors. This was owing to the imperfection of government in thoſe days; ſo that the nobles had it in their power to revenge their own quarrels, while the weak were equally expoſed to the inſults of both parties. The lord and his vaſſals therefore were always formidable; but the allodial proprietors had ſcarce any means of defending themſelves. The reaſon of this was, in the firſt place, that the law did not allow them to commit any hoſtilities; and in the next, they were too diſtant and unconnected to form any proper league for mutual defence; and hence proceeded the neceſſity already hinted at, of converting allodial property into feudal tenure. This was indeed owing in a great meaſure to the abſurdity and violence of the times, by which gifts of property, burthened with ſervice, and which might return to the perſon who granted them, were rendered ſuperior in value to the abſolute and unconditional poſſeſſion of a ſubject. Other conſiderations, however, beſides that juſt mentioned, contributed to produce the ſame effect. As in thoſe dark ages no right exiſted but what had its origin in conqueſt, it thence followed that the greateſt conqueror or warrior was the moſt honourable perſon. The king, in whom the whole exploits of the community centred, as being their head, was the moſt honourable perſon; all others derived from him that portion of honour which they enjoyed, and which was moſt nicely adjuſted in proportion as they approached him. Allodial proprietors therefore having no pretenſions of this kind, were treated with contempt as a kind of poltroons. From this diſagreeable ſituation they wiſhed to free themſelves, by converting their allodial property into feudal tenures; while the princes, ſuppoſing it their intereſt to extend thoſe tenures as much as poſſible, diſcouraged the allodial poſſeſſions.

6 Converſion of allodium into tenure

As the feodiſts ſupported the importance of the nation and dignity of the monarch, it was not thought proper to allow the allodial proprietors any greater compenſations than what were given to vaſſals in ſimilar caſes. Thus they were expoſed to continual mortifications in the courts of juſtice; they were neglected by the king; denied ſufficient protection from the laws; expoſed not only to continual inſults, but to have their property on all occaſions deſtroyed by the great: ſo that they were without reſource except from the feodal tenures, and were obliged even to ſolicit the privileges which were beſtowed in other caſes on vaſſals. In theſe unhappy circumſtances, they were glad to yield up their lands to any ſuperior whom they thought moſt agreeable, and to receive them back from him as a feudal gift.

(B) The author of *A view of Society in Europe*, has traced the remote ſources of the feodal laws in an elegant and ſpirited manner (Book I. Chap. II. Sect. I.) Tacitus informs us, that the individuals of each of the German nations cultivated by turns a tract of land proportionable to their number, for the uſe of the whole; after which each individual received ſuch an allotment of the cultivated tract as his dignity ſeemed to require. Theſe nations had not altered their political principles at the time they over-ran the Roman empire; and hence the provinces of it were then divided after the ſame manner. The moſt conſiderable allotment was beſtowed on the king, as being the moſt dignified perſon in the community, and this allotment was ſtyled his *domain*; while the ſhares of citizens and warriors, which were likewiſe in proportion to the merit or dignity of each, conſtituted what was called *allodiality*. But as it often happened that all the land was not exhauſted by theſe partitions, what remained was conſidered as the property of the community, and in the barbaric codes was called the *lands of the fiſc*. In ſuch German nations as had thus obtained a ſettlement, it was neceſſary that there ſhould be a more cloſe connection betwixt the ſovereign and the chiefs, as well as between the chiefs and people, than in others. This was effected by means of the lands of the *fiſc*; for of theſe the ſovereign took poſſeſſion, dealing them out to the chiefs under the burthen of appearing in arms whenever he ſhould pleaſe to call: while the chiefs in like manner dealt out lands to thoſe called their *retainers*, who were alſo obliged to ſupply them with military aſſiſtance in caſes of neceſſity. Hence a political ſyſtem was founded, which had a prodigious effect on ſociety in all thoſe countries where it prevailed. The intention and tendency of this ſyſtem was to render the nation independent both at home and abroad; for while the people were all armed in their common defence, individuals were alſo properly guarded againſt the attacks of deſpotiſm. The power of the chiefs who formed a regular nobility, was a counterpoiſe to that of the ſovereign; while the number of the retainers and vaſſals, conſtituting the greatneſs and power of the nobility, was a proper barrier againſt ariſtocratical oppreſſion; for a chief who oppreſſed his vaſſals evidently acted againſt his own intereſt.

Thus the landed property was every where changed into feudal tenures, and fiefs became univerſal (c).

For ſome time the feudal ſyſtem was not only uſeful in itſelf, but honourable in its principles; but this continued no longer than while the importers of it into Europe adhered to their original ſimple and noble maxims. During that period, the lord exerciſed his bounty to the vaſſal, which the latter repaid by acts of gratitude; ſo that the intercourſe betwixt them was of the moſt tender and affectionate kind; and this gave riſe to what are called the *feodal incidents*.

7
The feodal incidents.

The expectants of fiefs were educated in the hall of the ſuperior, while the tenures were precarious or only for life: and even when they became hereditary, the lord took care of the ſon and eſtate of his deceaſed vaſſal; not only protecting his perſon, but taking charge of his education, and directing the management of his affairs. He took pleaſure in obſerving his approach to maturity; and when he came of age, never failed to deliver to him the lands, with the care of which he had been entruſted, and which he had been careful to improve. This was called the *incident of wardſhip*.

The incident of *relief* was founded upon the gratitude of the vaſſal; who, upon entering on his fief, brought a preſent to his lord, as an acknowledgment of his care of him during the early part of his life, and in order to conciliate his future regard.

The incident of *marriage* proceeded alſo upon the principle of gratitude on the part of the vaſſal. The latter, conſcious of the favours he had received, did not chooſe to ally himſelf with a family inimical to his chief: while the ſuperior himſelf, ambitious to aggrandiſe and augment the importance of his family, ſought how to find the moſt advantageous match for his vaſſal.

Sometimes the ſuperior himſelf was reduced in his circumſtances by war or other accidents: but from whatever cauſe his diſtreſs proceeded, even though it had ariſen from his own extravagance or prodigality, or when only deſtitute of means to ſupport his ambition or grandeur, his vaſſals were bound to ſupport and relieve

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(c) It has been an object of inquiry to the learned, in what nation of barbarians fiefs had their origin? But it is probable, that they took place in all of theſe nations nearly about the ſame time, on the ſame principles, and were continued by reaſon of a ſimilarity of manners, conqueſts, &c. ſo that we cannot aſcribe the prevalence of them to imitation.

In France, we find mention made of fiefs as early as the age of Childebert. They were introduced into Italy by the Lombards; among whom the cuſtoms and laws relating to fiefs ſeem very early to have made rapid advances*, They were introduced into Spain before the invaſion of the Moors or Saracens in the year 710. Lands were granted for ſervice and attachment among the Goths; among whom alſo the perſon who received the gift was the retainer of him who granted it. If he refuſed his ſervice, the grant was forfeited; and he was ſaid to receive it *in patrocinio:* he alſo ſwore fealty to his lord; and on this footing the national militia was regulated†. There can be very little doubt that the feudal law was known in England in the Saxon times, as is mentioned in the text‡. In Scotland, however, the hiſtory of fiefs is ſtill more uncertain than any where elſe; which has been aſcribed partly to the mutilated ſtate of the Scottiſh records, and partly to the want of able antiquaries in the nation. But, according to a late writer||, allodiality and feudality have exiſted ever ſince the foundation of the Scottiſh monarchy, and have moſt probably ariſen from a ſimilarity of the manners and cuſtoms in Scotland to thoſe of other nations. It has indeed been ſuppoſed, that theſe cuſtoms were introduced from ſome foreign model by Malcolm II. According to ſome, they were introduced directly from England; and the policy of Malcolm in eſtabliſhing them has been highly extolled: but, according to our author, there is no foundation for any notion of that kind. Both the opinions juſt mentioned either directly aſſert or imply, that the feudal maxims were introduced into that country upon the principle of imitation; but it is very improbable that they could be imported from one people to another, on account of their exceſſive contrariety to the common uſages and precepts of government among mankind. It muſt undoubtedly have been very abſurd, if not altogether impracticable, to tranſplant the feudal tenures when the grants of land were precarious, or depending entirely on the will of the prince, to a country which had never known ſuperiority or vaſſalage. This would have required an alteration of all the orders of ſociety from the king to the peaſant; while the whole chain of cuſtoms, as well as the juriſdiction of the kingdom, both high and low, muſt have ſuſtained a correſponding alteration, in order to conform them to the new ſyſtem. It is likewiſe obvious, that no conqueſt could be made on purpoſe to obtain a ſettlement by any nation who had already received the knowledge of fiefs. The eſtabliſhment of them implied, that the people had already a fixed and ſettled reſidence; and accordingly hiſtory does not furniſh us with any account of a nation among whom fiefs were known, who ever migrated from the country they already poſſeſſed, to ſeek for one in which they might ſettle. Feudal inſtitutions muſt have originated wherever they have been obſerved to flouriſh. Scotland was formerly a feudal kingdom, and we know pretty nearly the time when the fiefs were hereditary there: but in that form they could not be introduced by the ſovereign; and there was not any nation among whom fiefs were already known who conquered, or made an eſtabliſhment by conqueſt, in Scotland. Fiefs therefore muſt have *gradually* advanced to ſuch a ſtate of perfection. The progreſs they made may be likewiſe eaſily pointed out. At firſt they were precarious, or at the pleaſure of the lord; afterwards they were granted for life; then for a courſe of years longer than the natural life of a man; and, laſtly, they became hereditary, which was their moſt perfect ſtage. This progreſs has been obſerved in every country where feudal tenures exiſt; and the ſame muſt have been known in Scotland, though in conſidering it we are neceſſarily carried back to periods of remote antiquity; for as fiefs were hereditary as early as the time of Malcolm II. they muſt have been in their precarious ſtate ſeveral centuries before.

* *Giannone Hiſt. of Naples*, book iv, ſect. 3.

† *L. L. Wiſigoth, lib.* v. tit. 3. lib. iv. tit. 7. l. xx.

‡ See alſo *Whitaker's Hiſt. of Mancheſter.*

|| *Stuart's Obſervat. on the Law and Conſtitution of Scotland.*

lieve him according to their circumſtances; and this was called the *incident of aid*.

The incident of *eſcheat* took place on the part of the vaſſal, when, through cowardice, treachery, or any remarkable miſbehaviour, he rendered himſelf unworthy of his fief. In that caſe, the taking it from him, and giving it to one more worthy, was called an *eſcheat*.

8 Happineſs of the feodal aſſociation.

While the lords and vaſſals thus vied with one another in mutual acts of friendſhip and benevolence, univerſal happineſs, liberty, and activity, were diffuſed through the ſociety. The vaſſals behaved courteouſly towards the retainers, who were immediately below them; while they again were courted by the lords as conſtituting their importance and ſtrength; the lords, laſtly, giving a like importance and dignity to the ſovereign himſelf. Thus a regular, powerful, and compact ſyſtem of government took place; an unanimity and attention pervaded the various departments of ſtate; ſo that while the ſubjects were free, the nation at large was formidable.

9 Its declenſion.

During this happy ſtate of affairs, the members of the national aſſembly in every country in Europe appeared there in arms, whether they came perſonally or by their repreſentatives. Such particularly was the caſe under the Anglo-Saxon government; and the happineſs they at that time enjoyed made the oppreſſion and tyranny of the Normans appear the more intolerable. In proceſs of time, however, the ſtate of ſociety began to ſuffer a remarkable alteration. The high and diſintereſted notions, from which the happineſs above mentioned took its origin, declined; the romantic ideas of chivalry * ceaſed; and much more intereſted notions of property came in their ſtead. The ſeparation of the intereſts of the lords from their vaſſals was the firſt ſtep towards the deſtruction of the feodal ſyſtem.

10 The perverſion of its incidents.

Thus the *incidents*, which, as has juſt now been mentioned, promoted their happineſs, did the very reverſe. Property being now looked upon as a diſtinction ſuperior to perſonal merit, naturally introduced the moſt mercenary views. In conſequence of theſe, the infant *ward*, the care of whom was wont to be conſidered as a ſacred and honorary truſt, was now only looked upon as a mean of procuring emolument to the ſuperior. The latter now regarded the profits of his vaſſals as ſo many diminutions of his own wealth. Inſtead of taking care to improve the eſtate of his ward as formerly, he impoveriſhed it; not only neglecting the education of the heir, but offering inſults to himſelf; inſomuch that the relations of the unfortunate vaſſal were frequently obliged to ranſom from the avaricious ſuperior, both his perſon and effects. By merchandiſe of this kind the coffers of princes were filled, and wardſhips let out to ſtrangers, who might exerciſe their rapacity with greater freedom. When the vaſſal at laſt attained the years of maturity, he came to the poſſeſſion of his lands without any of that joy and feſtivity which uſually took place on the occaſion. He received an inheritance waſted and deſtroyed, while new grievances daily preſented themſelves to augment the horrors of his ſituation.

11 Oppreſſed ſituation of the vaſſals.

All the *incidents*, which in former times were ſo many expreſſions of gratitude on the part of the vaſſal, were now changed into taxes which might be exacted at the pleaſure of the lord. Before the vaſſal was inveſted in his land, the ſuperior exacted from him a certain ſum or other gift, to be meaſured only by his own rapacity; and in caſe of delay or inability to pay this demand, the ſuperior continued in poſſeſſion of the eſtate. Such ſcandalous oppreſſion could not but produce the greateſt diſcontent and clamour. Applications were made to the law without ſucceſs; nor were even the laws regarded which were fabricated on purpoſe for their relief. The incident of *marriage* now proved a ſource of the moſt dreadful oppreſſion. The lord aſſumed the right of marrying his vaſſal to whom he pleaſed; and he not only exerted this right himſelf, but would ſell it to a ſtranger, or allow the vaſſal to buy it himſelf; while the penalty annexed to a marriage without the conſent of the ſuperior involved no leſs puniſhment than the loſs of the eſtate itſelf, or ſome grievous infliction as for a crime of the firſt magnitude. The caſe was ſtill worſe with a female ward; whoſe beauty and accompliſhments became a ſource of gain to the ſuperior, or were ſacrificed to pleaſe his whim or caprice: ſo that her relations were frequently obliged to buy from him the privilege of marrying her to the perſon ſhe or they thought moſt proper. In like manner the *aid*, which was formerly a voluntary gift from the vaſſal, in caſes of diſtreſs happening to his lord, now became an unavoidable tax. An aid formerly was demanded when the eldeſt daughter of the ſuperior was married, when his eldeſt ſon was knighted, or when the ſuperior himſelf was taken priſoner in battle. Theſe were the only legal cauſes of making a demand of this kind: but in the ſubſequent times of degeneracy, the moſt frivolous pretences were every day made uſe of by the prince to oppreſs the lords, and by the lords to oppreſs their vaſſals; demanding ſubſidies at pleaſure, which their inferiors were always obliged to comply with. Laſtly, the *eſcheat*, which in former times took place only in caſes of cowardice, treachery, or ſome other henious crime, was now inflicted on the moſt trifling occaſions. If the vaſſal happened to be too long in attending the court of his ſuperior to take the oath of fealty; if he committed any action which could in the leaſt be conſtrued an infringement of the oath; if he neglected to give his lord warning of any misfortune which he might ſuppoſe was about to befal him; revealed any thing concerning him; made love to his ſiſter or daughter, &c.; or even if he ſhould grant a tenure of land to another perſon in form different from that in which he held his own; all theſe, nay others ſtill more ridiculous, were judged ſufficient reaſons for the ſuperior to ſeize on the eſtate of the vaſſal, and involve him and his family in ruin.

12 Conſequent degeneracy of the feodal militia.

Notwithſtanding theſe oppreſſions, however, the vaſſal was ſtill obliged to ſubmit to his lord; to own him as his ſuperior; and even, in appearance, to pay him the ſame reſpect as formerly when the greateſt unanimity and cordial affection ſubſiſted between them. Still he was obliged to perform the ſame military ſervice; becauſe a failure in that reſpect would have ſubjected him to a forfeiture of lands according to the original agreement. A vaſt difference, however, now took place in the valour and activity which inſpired the army. The vaſſals, forced into the field with deſponding hearts, were indifferent as to the ſucceſs of the cauſe in which they were engaged, and frequently obſtructed inſtead of forwarding the operations of the

* See *Chivalry* and *Knights*.

field. Hence the ſovereign found himſelf embarraſſed; and, though nominally at the head of a martial and powerful people, was frequently unable to effect any thing by reaſon of the mutual hatred and diſſenſion which every where prevailed.

13
Expedient for its recovery.

Thus the feodal ſtates of Europe became unnaturally weak: a remedy was neceſſary; and it is remarkable, that the ſame remedy was applied all over the continent. This was, in ſhort, the making fiefs hereditary, which till now had only been granted for a long term of years: and, in return, burdening the lands with a certain number of ſoldiers, which were not to be refuſed upon any pretence whatever.

14
Invention of knight-ſervice.

Hence was derived the tenure of *knight-ſervice*. A certain portion of land, burdened with the ſervice of one ſoldier or knight, was called a *knight's-fee*; and thus an eſtate, furniſhing any number of ſoldiers, was ſaid to contain as many knight's fees; ſo that now the manours, baronies, &c. became powerful according to the number of ſoldiers they were bound to furniſh. In the grants from the crown, the nobility were obliged to furniſh a certain number of ſoldiers for the ſervice of the ſovereign; and in thoſe from the nobility to their vaſſals, the like ſervice was required. Even the commons who had grants from the crown, furniſhed a certain proportion of knights. The force of the nation was called into action by grants *in capite*, or from the ſovereign and nobility. A numerous and powerful army was inſtantly aſſembled, and at once ready for action. Of this army the king was the general, the nobility the officers, and the vaſſals ſoldiers; the whole being exactly arranged, and capable of entering upon any expedition without the leaſt delay.

Thus a remedy was found in ſome meaſure for the weakneſs of the feodal ſovereigns: but though the knights-tenure could accompliſh this, it could not bring back the former affection and cordiality which ſubſiſted between the various ranks of people. On the contrary, by uniting them more firmly to one another by legal ties, it rendered matters rather worſe. The oppreſſion originating from the operation of the feodal *incidents*, ſtill continued with unremitting violence. The grants of knights-tenure were attended with the ſame oaths of homage and fealty; the ſame incidents of relief, wardſhip, marriage, aid, and eſcheat, with the feodal tenures. The princes promiſed to abate ſomewhat of their rigour in demanding the feodal perquiſites, but did not keep their word. Laws were occaſionally promulgated, and for ſome time had an effect; but palliatives ſoon became ineffectual, and a new ſtate of weakneſs began to commence.

15
Two eras in the hiſtory of fiefs.

The two remarkable eras in the feodal hiſtory are, the time before the invention of knight-ſervice (D), and that during which it continued. Fiefs were in a ſtate of fluctuation from the deſtruction of the Roman empire till the ninth century; but they were rendered perpetual in France about the year 877, and were generally become ſo in every country of Europe about the beginning of the tenth. Du Cange, *voce Militia*, gives us an example of a knight-fee in the year 880. By the year 987, when Hugh Capet was raiſed to the throne of France; knight-ſervice was become general all over Europe, and was introduced into England after having made its appearance in other countries (E).

16
Doubts concerning the introduction of the feodal laws into England.

In England, however, there have been ſeveral doubts and inquiries among the learned concerning the introduction of the feodal laws. Many are of opinion, that they were firſt introduced by William the Conqueror; and, conſequently, that they were entirely unknown to the Anglo-Saxons: but others think, that they exiſted among the latter in the ſame form under which they were continued by the Normans. Dr Stuart is of opinion, that the Saxons who ſettled in England could not be ſtrangers to fiefs. He ſuppoſes the conformity of manners, which undoubtedly prevailed between the Saxons and other barbarians, a ſufficient proof that the hereditary grant of land, as well as the fluctuating ſtate of feodal tenures which preceded it, were known to the former. Collateral proofs are derived from the ſpirit and tenure of the Anglo-Saxon laws, but eſpecially from the grants of hereditary eſtates on condition of military ſervice (F). The condition of fiefs under the Anglo-Saxons was very different from what it was afterwards. In their times we find no mention made of thoſe oppreſſions of which ſo much notice has already been

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(D) For the difference between the knights produced by this ſervice and the more ancient ones, or knights of honour, ſee the article KNIGHT.

(E) Dr Stuart informs us, that it appears from the records of Malcolm IV. in 1153, that knights-ſervice was known in Scotland, and that it was not a novelty at that time. The ſame author thinks it even probable that it was known in the time of David I.

(F) The uſe of intails was known to the Anglo-Saxons; and this practice, as well as the ſucceſſion to allodial eſtates, muſt have contributed very much to eſtabliſh hereditary fiefs. This opinion ſeems alſo to be confirmed by the accounts we have of the great power of many of the nobility among the Anglo-Saxons, and the natural tendency that fiefs muſt have, in the courſe of things, to become perpetual, though analogical arguments cannot entirely be depended upon in this caſe. There is indeed poſitive evidence that the territory which anciently conſtituted the kingdom of Mereland belonged to Ethelred as an hereditary fief and earldom. The grant was given him by Alfred when he married his daughter Ethelfleda: and it is likewiſe atteſted by Camden, that in the time of Ethelred the earldom of Leiceſter was an inheritance, and the regular ſucceſſion of its earls is ſtill known. We are informed alſo by creditable hiſtorians, that Bernicia and Deireland were feodal and inheritable earldoms among the Saxons. The ſame was true of the county of Cumberland when poſſeſſed by the Scottiſh monarchs. This laſt appears from the Saxon Chronicle; in which the grant was conveyed by Edmund king of England to Malcolm of Scotland in the following terms; "Edmundus rex totam Cumberland prædavit et contrivit, et *commendavit* eam Malcomo regi Scotiæ; hoc pacto, quod *in auxilio* ſibi foret terra et mari." From the uſe of the word *commendavit*, indeed, Spelman takes occaſion to ſay, that a feodal homage was not intended: but the contrary may be proved by the original Saxon from which the foregoing been taken; and this may eaſily be accounted for from the alteration of the feodal ſpirit in different ages. During the time that a warm and generous affection ſubſiſted between the feodal ſuperiors and vaſſals, the incidents were marks of generoſity on the one part, and gratitude on the other; but as ſoon as a variance had taken place, by reaſon of the intereſted diſpoſition which the introduction of luxury produced, the ſame incidents became ſources of the moſt flagrant oppreſſion. This was remarkably the caſe in the time of William the Conqueror; and, during the reign of king John, matters were come to ſuch a criſis, that the people every where complained loudly, and demanded the reſtoration of the laws of Edward the Confeſſor (G). "What theſe laws of Edward the Confeſſor were (ſays Mr Hume), which the Engliſh every reign during a century and an half deſired ſo paſſionately to have reſtored, is much diſputed by antiquarians; and our ignorance of them ſeems one of the greateſt defects of the ancient Engliſh hiſtory." Dr Stewart has offered an explanation; but this is in fact no more than a conjecture, that "by the laws or cuſtoms of the Confeſſor, that condition of felicity was expreſſed which had been enjoyed during the fortunate ſtate of the feodal aſſociation. The cordiality, equality, and independence, which then prevailed among all ranks in ſociety, continued to be remembered in leſs proſperous times, and occaſioned an ardent deſire for the revival of thoſe laws and uſages which were the ſources of ſo much happineſs.

17
Inſufficient ſolution of them by Dr Stuart.

18
Diſtinction concerning fiefs in the Anglo-Saxon and the Anglo-Norman times.

Beſides the great diſtinction (of which an account has already been given) between the ſtate of fiefs under the Anglo-Saxons and under the Normans, they were no leſs diſtinguiſhed by the introduction of knight-ſervice. Hitherto the refinement of the Engliſh had been obſtructed by the invaſion of the Danes, and the inſular ſituation of the kingdom; but after the Norman conqueſt the fiefs were made perpetual. Still, however, the knight-fee and knight-ſervice were altogether unknown. William, the ſixth prince who enjoyed the duchy of Normandy, was well acquainted with every thing relating to fiefs; for that duchy had experienced all the variety incidental to them from the time of its being granted to Rollo by Charles the Simple in the year 912, to the year 1066, when William was put in poſſeſſion of England by the battle of Haſtings.

19
Introduction of knight-ſervice into England.

On his acceſſion to the throne, a number of forfeitures took place among thoſe who had followed the fortune of Harold. Their eſtates were to be diſpoſed of at the pleaſure of the conqueror; and it was natural to ſuppoſe that he would follow the method practiſed in his own country. Hence the origin of knight-ſervice in England. A grant of land, to any perſon whatever, was eſtimated at a certain number of knights-fees; and each of theſe required the ſervice of a knight. The grants of lands were even renewed to the old tenants under this tenure; ſo that by degrees the whole military people in the kingdom acquieſced in it. To accompliſh this, DOMESDAY *Book* is ſuppoſed to have been compiled, which contained an exact account of all the landed property of the kingdom. Hence it is to be concluded, not that William introduced fiefs into England, as ſome have imagined, but that he brought them to their ultimate ſtate of perfection by the introduction of knight-ſervice. This is evident from the laws enacted during his reign. In theſe it is not only mentioned that knight-ſervice was enacted, but that it was done expreſsly with the conſent of the common council of the nation; which at that time was equivalent to an act of parliament (H).

20
Idea of the feodal militia.

The invention of knight-ſervice proved generally agreeable; for as only few of the Anglo-Saxon fiefs were hereditary, the advancement of the reſt to perpetuity, under the tenure of knight-ſervice, muſt have been accounted an acquiſition of ſome importance; as not only augmenting the grandeur and dignity of the ſovereign, but ſecuring the independence of the ſubject, and improving his property. In the happy ſtate of the feodal aſſociation, there was indeed no neceſſity for the knight's fee; but when the diſcordance and oppreſſion ſo often mentioned began to take place, it became then neceſſary to point out particularly every duty of the vaſſal, as well as of the lord; and this was fully done by the invention of knight-ſervice. The nobles poſſeſſed duchies, baronies, and earldoms; which extenſive poſſeſſions were divided into as many fees, each of them to furniſh a knight for the ſervice of the king, or of the ſuperior: ſo that every feudal ſtate could command a numerous army

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going is a Latin tranſlation; and the word, according to ſeveral learned critics, ſignifies feodal homage with the moſt ſtrict propriety. Thus Du Cange informs us, that *commendare ſe alicui* was the general expreſſion for *faire l'homage a un ſuſerain.*

(G) The laws which are now extant under the name of Edward, are generally allowed to be of doubtful authenticity; nor are they, even ſuppoſing them to be genuine, of any uſe in anſwering the preſent queſtion. They determine indeed the exiſtence of fiefs among the Anglo-Saxons: and Dr Stuart is of opinion, that the compilation which goes under the name of this prince, though poſterior to the date it bears, nevertheleſs merits greater attention than has uſually been beſtowed upon it. M. Honard, a foreign lawyer, is the lateſt writer who has made it his ſtudy; but he is better acquainted with the Norman than the Anglo-Saxon cuſtoms.

(H) The following law of William the Conqueror not only makes expreſs mention of the knight's fee and ſervice, but alludes to a former law of William and his parliament, by which this tenure was actually eſtabliſhed. "Statuimus etiam et firmiter præcipimus, ut omnes comites, et barones, et milites, et ſervientes, et univerſi "liberi homines totius regni noſtri prædicti, habeant et teneant ſe ſemper bene in *armis* et in *equis*, ut decet "et oportet, et quod ſint ſemper prompti et bene parati ad *ſervitium ſuum integrum* nobis explendum, et peragendum, cum ſemper opus adfuerit, ſecundum quod NOBIS debent de *feodis et tenementis ſuis* de jure facere, "et ſicut illis ſtatuimus per *commune conſilium* totius regni noſtri prædicti, et dedimus et conceſſimus in feodo "jure hæreditario." *L. L. Guill.* c. 58.

and militia to ſupport and defend it in caſe of any emergency. The knights were alſo bound to aſſemble in complete armour whenever the ſuperior thought proper to call, and to hold themſelves in readineſs for action whenever the king or ſuperior found it convenient to take the field: ſo that thus the militia might be marched at the ſhorteſt notice to defend or ſupport the honour of the nation.

The knights were uſually armed with an helmet, ſword, lance, and ſhield; and each was beſides obliged to keep a horſe. This laſt requiſite was owing to the contempt into which the infantry had fallen through the prevalence of tournaments and luxuries of various kinds, though it was by means of the infantry that the barbarians had originally diſtinguiſhed themſelves in their wars with the Romans, and became able to cope with theſe celebrated warriors. All proprietors of fees or tenants by knight-ſervice fought on foot: the cavalry were diſtinguiſhed by the name of *battle*; and the ſucceſs of every encounter was ſuppoſed to depend on them alone. They only were completely armed; the infantry, being furniſhed by the villages under the juriſdiction of the barons, had at firſt only bows and ſlings; though afterwards they were found worthy of much greater attention.

21
Its inefficacy and corruption.

While the feodal aſſociation remained in perfection, the ſuperior could at any time command the military ſervice of his vaſſals; but in the ſubſequent degeneracy this ſervice could neither be depended upon when wanted, nor was it of the ſame advantage when obtained as formerly. The invention of knight-ſervice tended in a great degree to remedy this inconvenience. Thoſe who were poſſeſſed of knights fees were now obliged to remain 40 days in the field at their own expence; and this without exception, from the great crown vaſſals to the ſmalleſt feudatories; but if longer ſervice was required, the prince was obliged to pay his troops. In thoſe times, however, when the fate of nations was frequently decided by a ſingle battle, a continuance in the field for 40 days was ſufficient for ordinary occaſions.

Thus matters ſeemed once more to be reſtored nearly to their former ſtate. It was now, as much as ever, the intereſt of the nation to act with unanimity in its defence, not only againſt foreign enemies, but againſt the tyranny of the prince over his ſubjects, or of one part of the ſubjects over the other. New inconveniencies, however, ſoon began to take place, owing to the gradual improvement in life and the refinement of manners. From the firſt inſtitution of military ſervice, a fine had been accepted inſtead of actual appearance in the field. In the times of barbarity, however, when men accounted rapine and bloodſhed their only glory, there were but few who made an offer of this compenſation; but as wealth and luxury increaſed, and the manners of people became ſofter, a general unwillingneſs of following the army into the field became alſo prevalent. A new tenure, called *eſcuage*, was therefore introduced; by which the vaſſal was only obliged to pay his ſuperior a ſum of money annually inſtead of attending him in the field *. Hence originated taxes and their miſapplication; for as the king was lord paramount of the whole kingdom, it thence happened that the whole eſcuage money collected throughout the nation centred in him. The princes then, inſtead of recruiting their armies, frequently filled their coffers with the money, or diſſipated it otherwiſe, hiring mercenaries to defend their territories when threatened with any danger. Theſe being compoſed of the dregs of the people, and diſbanded at the end of every campaign, filled all Europe with a diſorderly banditti, who frequently proved very dangerous to ſociety. To avoid ſuch inconveniencies, ſtanding armies were introduced, and taxations began to be raiſed in every European kingdom. New inconveniencies aroſe. The ſovereigns in moſt of theſe kingdoms, having acquired the right of taxation, as well as the command of the military power, became completely deſpotic: but in England the ſovereign was deprived of this right by Magna Charta, which was extorted from him, as related under the article ENGLAND, [n° 153]; ſo that, though allowed to command his armies, he could only pay them by the voluntary contributions of the people, or their ſubmitting to ſuch taxations as were virtually impoſed by themſelves.

22
Riſe of ſtanding armies, &c.

FEOFFMENT, in law, (from the verb *feoffare* or *infeudare*, "to give one a feud"); the gift or grant of any corporeal hereditament to another. He that ſo gives, or enfeoffs, is called the *feoffer*; and the perſon enfeoffed is denominated the *feoffee*.

This is plainly derived from, or is indeed itſelf the very mode of, the ancient feodal donation; for though it may be performed by the word "enfeoff" or "grant," yet the apteſt word of feoffment is *do* or *dedi*. And it is ſtill directed and governed by the ſame feodal rules; inſomuch that the principal rule relating to the extent and effect of the feodal grant, *tenor eſt qui legem dat feudo*, is in other words become the maxim of law with relation to feoffments, *modus legem dat donationi*. And therefore, as in pure feodal donations, the lord, from whom the feud moved, muſt expreſsly limit and declare the continuance or quantity of eſtate which he meant to confer, *ne quis plus donaſſe præſumatur, quam in donatione expreſſerit*; ſo, if one grants by feoffment lands or tenements to another, and limits or expreſſes no eſtate, the grantee (due ceremonies of law being performed) hath barely an eſtate for life. For, as the perſonal abilities of the feoffee were originally preſumed to be the immediate or principal inducements to the feoffment, the feoffee's eſtate ought to be confined to his perſon and ſubſiſt only for his life; unleſs the feoffer, by expreſs proviſion in the creation and conſtitution of the eſtate, hath given it a longer continuance. Theſe expreſs proviſions are indeed generally made; for this was for ages the only conveyance, whereby our anceſtors were wont to create an eſtate in fee-ſimple, by giving the land to the feoffee, to hold to him and his heirs for ever; though it ſerves equally well to convey any other eſtate of freehold.

But by the mere words of the deed the feoffment is by no means perfected: there remains a very material ceremony to be performed, called *livery of ſeiſing*; without which the feoffee has but a mere eſtate at will. See SEISIN.

FERÆ, in zoology, an order of quadrupeds. See ZOOLOGY.

FERALIA, in antiquity, a feſtival obſerved among

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* See the particular conſequences of this under the article *Knight-Service*.

mong the Romans on February 21ſt, or, according to Ovid, on the 17th of that month, in honour of the manes of their deceaſed friends and relations.

Varro derives the word from *inferi*, or from *fero*; on account of a repaſt carried to the ſepulchres of ſuch as the laſt offices were that day rendered to. Feſtus derives it from *ferio*, on account of the victims ſacrificed. Voſſius obſerves, that the Romans called death *fera*, "cruel," and that the word *feralia* might ariſe thence. —Macrobius Saturn. lib. i. cap. 13. refers the origin of the ceremony to Numa Pompilius. Ovid, in his Faſti, goes back as far as Æneas for its inſtitution. He adds, that on the ſame day a ſacrifice was performed to the goddeſs Muta, or Dumb; and that the perſons who officiated were an old woman attended with a number of young girls.

During the continuance of this feſtival, which laſted eleven days, preſents were made at the graves of the deceaſed, marriages were forbidden, and the temples of the gods ſhut up. While the ceremonies continued, they imagined that the ghoſts ſuffered no puniſhments in hell, but that their tormentors allowed them to wander round their tombs, and feaſt upon the meats which their ſurviving friends had prepared for them.—For a more particular account of the offerings and ſacrifices and feaſts for the dead, ſee INFERIÆ and SILICERNIUM.

Sometimes at the feralia public feaſts were given to the people at the tombs of the rich and great by their heirs or particular friends.

FER DE FOURCHETTE, in heraldry, a croſs having at each end a forked iron, like that formerly uſed by ſoldiers to reſt their muſkets on. It differs from the croſs-fourché, the ends of which turn forked; whereas this has that ſort of fork fixed upon the ſquare end. See HERALDRY.

FER de Moulin, Milrinde, Inke de Moulin, in heraldry, is a bearing ſuppoſed to repreſent the iron-ink, or ink of a mill, which ſuſtains the moving mill-ſtone.

FERDINAND V. king of Spain, called *the Catholic*, which title was continued to his ſucceſſors. He married Iſabella of Caſtile, by which that kingdom was united to the Spaniſh crown. This illuſtrious couple laid the foundation of the future glory and power of Spain. The conqueſt of Granada, and the diſcoveries of Chriſtopher Columbus, make this reign a celebrated era in the hiſtory of Spain. He died in 1516, aged 63. See (*Hiſtory* of) SPAIN.

FERENTARII, in Roman antiquity, were auxiliary troops, lightly armed; their weapons being a ſword, bow, arrows, and a ſling.

FERENTINUM, (anc. geog.), a town of the Hernici in Latium, which the Romans, after ſubduing that nation, allowed to be governed by its own laws. Now *Feretino*, an epiſcopal city in the Campania of Rome. E. Long. 14. 5. N. Lat. 41. 45.

FERENTUM, or FORENTUM, (anc. geog.), a town of Apulia in Italy. Now *Forenza*, in the Baſilicata of Naples.

FERETRIUS, a ſurname of Jupiter, *a ferendo*, becauſe he had aſſiſted the Romans; or *a feriendo*, becauſe he had conquered their enemies under Romulus. He had a temple at Rome built by Romulus. It was there that the ſpoils called *opima* were always carried.

FERETRUM, among the Romans, the bier uſed in carrying out the bodies of the dead, which duty was performed by the neareſt male relations of the deceaſed: thus, ſons carried out their parents, brothers their ſiſters, &c.

FERG, or FERGUE, (Francis Paul), a charming landſcape-painter, was born at Vienna in 1689, and there learned the firſt principles of his art. He ſucceſſively practiſed under Hans Graf, Orient, and Thiele. This laſt, who was painter to the court of Saxony, invited him to Dreſden to inſert ſmall figures in his landſcapes. Ferg thence went into Lower Saxony, and painted for the duke of Brunſwick and for the Gallery of Salzdahl. From Germany he went to London, where he might have lived in the higheſt eſteem and affluence, if, by an indiſcreet marriage, he had not been ſo effectually depreſſed, that he was ever after involved in difficulties. The neceſſities which aroſe from his domeſtic troubles, compelled him to diminiſh the prices of his paintings, in order to procure an immediate ſupport; and as thoſe neceſſities increaſed, his pictures were ſtill more ſunk in their price, though not in their intrinſic value. By a ſeries of misfortunes he was over-run with debts; and to avoid the purſuit of his creditors, he was conſtrained to ſecrete himſelf in different parts of London. He died ſuddenly in the ſtreet one night as he was returning from ſome friends about the year 1738, having not attained his 50th year: and left four children. This pleaſing artiſt, Mr Walpole obſerves, had formed a manner of his own from various Flemiſh-painters, though reſembling Poelemburg moſt in the enamelled ſoftneſs and mellowneſs of his colouring: but his figures are greatly ſuperior; every part of them is ſufficiently finiſhed, every action expreſſive. He painted ſmall landſcapes, fairs, and rural meetings, with the moſt agreeable truth; his horſes and cattle are not inferior to Wouvermans; and his buildings and diſtances ſeem to owe their reſpective ſoftneſs to the intervening air, not to the pencil. More faithful to nature than Denner, he knew how to omit exactneſs, when the reſult of the whole demands a leſs preciſion in parts. The greateſt part of his works are in London and Germany; and they now bear ſuch a price as is the moſt indubitable evidence of their real merit. He alſo etched well with aquafortis; and his prints of that kind are eſteemed by the curious.

FERGUS, the name of three kings of Scotland. See (*Hiſtory* of) SCOTLAND.

FERGUSON (James), an eminent experimental philoſopher and mechanic, was born in Scotland, of very poor parents. At the earlieſt age his extraordinary genius began to exert itſelf. He firſt learned to read, by overhearing his father teach his elder brother; and he had made this acquiſition before any one ſuſpected it. He ſoon diſcovered a peculiar taſte for mechanics, which firſt aroſe on ſeeing his father uſe a lever. He purſued this ſtudy a conſiderable length, even whilſt very young; and made a watch in wood-work, from having once ſeen one. As he had no inſtructor, nor any help from books, every thing he learned had all the merit of an original diſcovery; and ſuch, with infinite joy, he believed it to be. As ſoon as his age would permit, he went to ſervice; in which he met with hardſhips, which rendered his conſtitution feeble through life. Whilſt he was ſervant to a farmer (whoſe goodneſs he acknowledges in the modeſt and humble account of himſelf which he prefixed to his laſt publication), he frequently contemplated the ſtars; and began the ſtudy of aſtronomy, by laying down, from his own obſervations only, a celeſtial globe. His kind maſter, obſerving theſe marks of his ingenuity, procured him the countenance and aſſiſtance of his ſuperiors. By their help and inſtructions, he went on gaining farther knowledge, and was ſent to Edinburgh. There he began to take portraits; an employment by which he ſupported himſelf and family for ſeveral years, both in Scotland and England, whilſt he was purſuing more ſerious ſtudies. In London he firſt publiſhed ſome curious aſtronomical tables and calculations; and afterwards gave public lectures in experimental philoſophy, which he repeated (by ſubſcription) in moſt of the principal towns in England, with the higheſt marks of general approbation. He was elected a Fellow of the Royal Society, without paying for admiſſion (an honour ſcarcely ever conferred on a native); and had a penſion of 50 l. *per ann.* given him, unſolicited, by the king, at his acceſſion, who had heard lectures from him, and frequently ſent for and converſed with him on curious topics.—He alſo received ſeveral preſents from his majeſty, the patron of real merit. To what a degree of conſideration Mr Ferguſon mounted by the ſtrength of his natural genius, almoſt every one knows. He was univerſally conſidered as at the head of aſtronomy and mechanics in that nation of philoſophers. And he might juſtly be ſtyled ſelf-taught, or rather heaven-taught; for in his whole life he had not above half a year's inſtruction at ſchool. He was a man of the cleareſt judgment, and the moſt unwearied application to ſtudy; benevolent, meek, and innocent in his manners as a child: humble, courteous, and communicative; inſtead of pedantry, philoſophy ſeemed to produce in him only diffidence and urbanity,—a love for mankind and for his Maker. His whole life was an example of reſignation and Chriſtian piety. He might be ſaid to be an enthuſiaſt in his love of God, if religion, founded on ſuch ſubſtantial and enlightened grounds as his was, could be ſtyled enthuſiaſm. He died in 1776.

FERIÆ, in Roman antiquity, holidays, or days upon which they abſtained from work. Proclamation was generally made by the herald, by command of the *Rex Sacrorum*, or *Flamines*, that all ſhould abſtain from buſineſs; and whoever tranſgreſſed the order was ſeverely fined.—The feriæ were of two kinds, public and private.

The *public* Feriæ were fourfold. 1. *Stativæ*, which were kept as public feaſts by the whole city upon certain immoveable days appointed in their kalendar;—ſuch were the *Compitalia, Carmentalia, Lupercalia, &c.* 2. *Feriæ Conceptivæ*, which were moveable feaſts, the days for the celebration of which were fixed by the magiſtrates or prieſts: of this ſort were the *Feriæ Latinæ, Paganalia, Compitalia*, &c. which happened every year, but the days for keeping them were left to the diſcretion of the magiſtrates or prieſts. 3. *Feriæ Imperativæ*, which were fixed and inſtituted by the mere command of conſuls, prætors, dictators, upon the gaining of ſome victory or other fortunate event. 4. *Nundinæ*. See the articles NUNDINÆ, AGONALIA, CARMENTALIA, &c.

The *private* Feriæ were holidays obſerved by particular perſons or families on ſeveral accounts, as birth-days, funerals, &c. The feriæ belonged to, and were one diviſion of, the *dies feſti*. See FESTI.

FERIÆ *Latinæ*, a feſtival at which a white bull was ſacrificed, and the Latin and Roman towns provided each a ſet quantity of meat, wine, and fruits; and during the celebration, the Romans and Latins ſwore eternal friendſhip to each other, taking home a piece of the victim to every town. The feſtival was inſtituted by Tarquinius Superbus when he overcame the Tuſcans and made a league with the Latins, propoſing to build a common temple to Jupiter Latialis, at which both nations might meet and offer ſacrifices for their common ſafety. At firſt the ſolemnity laſted but one day, but it was at different times extended to ten. It was held on the Alban mount, and celebrated with chariot races at the capitol, where the victor was treated with a large draught of wormwood drink.

FERIA, in the Romiſh breviary, is applied to the ſeveral days of the week; thus Monday is the *feria ſecunda*, Tueſday the *feria tertia;* though theſe days are not working days, but holidays. The occaſion of this was, that the firſt Chriſtians were uſed to keep the eaſter-week holy, calling Sunday the *prima feria*, &c. whence the term *feria* was given to the days of every week. But beſides theſe, they have extraordinary feriæ, viz. the three laſt days of paſſion-week, the two following eaſter-day, and the ſecond feriæ of rogation.

FERIANA, the ancient city of Thala in Africa, taken and deſtroyed by Metellus in the war with Jugurtha. It was viſited by Mr Bruce in his late travels through Africa, who expected to have found many magnificent ruins in the place, but was diſappointed. The only remarkable objects he met with were the baths, which are exceſſively warm. Theſe are without the town, and flow from a fountain named *El Tarmid.* Notwithſtanding the exceſſive heat of its water, the fountain is not deſtitute of fiſhes. They are of the ſhape of a gudgeon, above four inches in length; and he ſuppoſed that there might have been about five or ſix dozen of them in the pool. On trying the water with a thermometer, he found the heat ſo great, that he was ſurpriſed the fiſh were not boiled in it. That fiſh ſhould exiſt in this degree of heat, is very ſurpriſing; but it ſeems no leſs wonderful that Mr Bruce, while ſtanding naked in ſuch water, ſhould leiſurely make obſervations on its heat, without ſuſpecting that he himſelf would be boiled by continuing there. We have to regret that the accidental wetting of the leaf on which he wrote down his remarks has deprived the public of the knowledge of the preciſe degree to which the thermometer is raiſed by this water. The fiſh are ſaid to go down the ſtream to ſome diſtance during the day, and to return to the ſpring or warmeſt part at night.

FERMANAUGH, a county of Ireland, in the province of Ulſter; bounded by Cavan on the ſouth, Tir-Oen on the north and north-eaſt, by Tyrconnel on the north-weſt, Leitrim on the ſouth-weſt, and Monaghan on the weſt. It is 38 miles long and 24 broad. A great part of it is taken up with bogs; and the great lake called *Lough-Earne*, which is near 20 miles in length, and in ſome places 14 in breadth, diverſified with upwards of 300 iſlands, moſt of them well wooded, inhabited, and covered with cattle. It abounds alſo with great variety of fiſh, ſuch as huge pike, large bream, roach, eels, trout, and ſalmon. The water of the lake in ſome places is ſaid to have a particular ſoftneſs and ſlimineſs, that bleaches linen much ſooner than could be done by other water. The lake is divided into the Upper and Lower, between which it contracts itſelf for five or ſix miles to the breadth of an ordinary river. In one part of the county are marble rocks 50 or 60 feet high. This county ſends four members to parliament, viz. two for the ſhire, and two for Inniſkillen the capital. Fermanaugh gives the title of viſcount to earl Verney.

FERMENT, any body which being applied to another, produces fermentation.

Ferments are either matters already in the act of fermentation, or that ſoon run into this act. Of the firſt kind are the flowers of wine, yeaſt, fermenting beer, or fermenting wine, &c. and of the ſecond are the new expreſſed vegetable juices of ſummer fruit.

Among diſtillers, ferments are all thoſe bodies which, when added to the liquor, only correct ſome fault therein, and, by removing ſome obſtacle to fermentation, forward it by ſecondary means: as alſo ſuch as, being added in time of fermentation, make the liquor yield a larger proportion of ſpirit, and give it a finer flavour.

FERMENTION, may be defined a ſenſible internal motion of the conſtituent particles of a moiſt, fluid, mixed or compound body; by the continuance of which motion, theſe particles are gradually removed from their former ſituation or combination, and again, after ſome viſible ſeparation is made, joined together in a different order and arrangement, ſo that a new compound is formed, having qualities very ſenſibly different from thoſe of the original fluid.

1 Subjects of fermentation.

Fermentation, properly ſo called, is confined to the vegetable and animal kingdoms; for the effervеſcences between acids and alkalies, however much they may reſemble the fermentation of vinous liquors, are nevertheleſs exceedingly different. It is divided into three kinds; or rather, there are three different ſtages of it, viz. the vinous, the acetous, and the putrefactive. Of the firſt, vegetables alone are ſuſceptible; the fleſh of young animals is in ſome ſlight degree ſuſceptible of the ſecond (A); but animal ſubſtances are particularly ſuſceptible of the third, which vegetables do not ſo eaſily fall into without previouſly undergoing the firſt and ſecond. The produce of the firſt ſtage is wine, or ſome other vinous liquor; of the ſecond, vinegar; or of the third, volatile alkali. See BREWING, VINEGAR, &c.

2 Phenomena of it.

Fermentation is one of the moſt obſcure proceſſes in nature, and no attempt has been made to ſolve it with any degree of probability. All that we know with regard to it is, that the liquor, however clear and tranſparent at firſt, no ſooner begins to ferment, than it becomes turbid, depoſits a ſediment, emits a great quantity of fixed air, and throws up a ſcum to the top, acquiring at the ſame time ſome degree of heat. The heat of the vinous ſtage, however, is but moderate, ſeldom or never exceeding that of the human body. The heat of the acetous is conſiderably greater; and that of the putrefactive is the greateſt of all, inſomuch that putrefying ſubſtances, when heaped together in great quantities, will ſometimes break forth into actual flame.

3 Attempt to explain the phenomena.

From theſe phenomena, fermentation would ſeem to be a proceſs ultimately tending to the entire diſſolution of the fermenting ſubſtance, and depending upon the action of the internal heat, etherial fluid, or whatever elſe we pleaſe to call it, which pervades, and makes an eſſential ingredient in, the compoſition of all bodies. From ſuch experiments as have been made upon this ſubject it appears, that whether fixed air is the bond of connection between the particles of terreſtrial bodies or not, yet the emiſſion of it from any ſubſtance is always attended with a diſſolution of that ſubſtance. We cannot, however, in the preſent caſe, ſay that the emiſſion of the fixed air is the *cauſe* of the fermentation. It is in fact otherwiſe. Fixed air hath no tendency to fly off from terreſtrial ſubſtances with which it is united; on the contrary, it will readily leave the atmoſphere after it hath been united with it, to join itſelf to ſuch terreſtrial ſubſtances as are capable of abſorbing it. The emiſſion of it, therefore, muſt depend upon the action of ſome other fluid; moſt probably the fire or heat, which is diſperſed thro' all ſubſtances in a latent ſtate, and in the preſent caſe begins ſenſibly to manifeſt itſelf. But from what cauſe the heat originally begins to operate in this manner, ſeems to be entirely unknown and inexplicable, except that it appears ſome how or other to depend on the air; for, if that is totally excluded, fermentation will not go on.

4 Mr Henry's experiments on producing fermentation by impregnating the liquor with fixed air.

In the Memoirs of the Mancheſter Society, Mr Henry gives an account of ſome experiments, in which he produced fermentation not only in bread and wort, but in liquors which we ſhould think quite incapable of it, viz. punch and whey. Having previouſly ſuſpected, from ſome obſervations and experiments, that yeaſt was only a quantity of fixed air involved and detained among the mucilaginous parts of the fermenting liquor, he attempted to prepare it in the following manner. Having boiled wheat-flour and water to the conſiſtence of a thin jelly, he put this viſcous fluid into the middle part of Dr Nooth's machine for impregnating water with fixed air. The gas was abſorbed in conſiderable quantity; and next day the matter was in a ſtate of fermentation. The third day it had acquired ſo much of the appearance of yeaſt, that an experiment was made on ſome paſte for bread; and after five or ſix hours baking it

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(A) Under the article CHINA, nº 114. a fact is mentioned which ſeems to ſhow that animal ſubſtances are likewiſe capable of the vinous fermentation; viz. that the Chineſe make uſe of a certain liquor called *lamb-wine*, and likewiſe that they uſe a kind of ſpirit diſtilled from *ſheep's fleſh*. This is related on the credit of M. Groſier: but as he does not mention the particulars of the proceſs, we are at liberty to ſuppoſe that the fleſh of theſe animals has been mixed with rice, or ſome other ingredients naturally capable of producing a vinous liquor; ſo that, inſtead of contributing any thing to the fermentation in queſtion, they may in reality be detrimental, and furniſh only that ſtrong and diſagreeable ſmell complained of in the liquid.

it was found to have anſwered the purpoſe tolerably well. Another experiment was made with wort; but here the artificial yeaſt was not made uſe of. Inſtead of this, part of the wort itſelf was put into Nooth's machine, and impregnated with fixed air, of which it imbibed a large quantity. On being poured into the remainder of the liquor, a briſk fermentation came on in 24 hours, "a ſtrong head of yeaſt began to collect on its ſurface, and on the third day it ſeemed fit for tunning." In proſecuting the experiment, good bread was made with the yeaſt taken off from the ſurface; and beer was produced by keeping the fermented liquor, and good ardent ſpirit produced by diſtilling it. In another experiment, in which a fourth part of the wort was impregnated but not ſaturated with fixed air, the fermentation did not commence ſo ſoon, though it is probable that it would alſo have taken place at laſt without any farther addition. The experiment commenced about midnight; but in the morning there were no ſigns of fermentation. At five in the afternoon there was only a ſlight *mantling* on the ſurface. A bottle with a perforated ſtopper and valve containing an efferveſcing mixture of chalk and vitriolic acid was then let down to the bottom of the veſſel; the diſcharge of air from this mixture was going on rapidly at nine o'clock; while the liquor at the ſame time ſeemed to be in a ſtate of efferveſcence. At 11 o'clock the bottle was withdrawn, as the fermentation was commenced beyond a doubt, the liquor, having a pretty ſtrong head of yeaſt upon it. Next day the fermentation ſeemed to be on the decline, but was recovered by a ſecond immerſion of the mixture. When the vinous fermentation was finiſhed, the liquor, by being kept too long, was found converted into vinegar; ſo that in the courſe of theſe experiments, ale, bread, yeaſt, ardent ſpirit, and vinegar had all been produced.

5
Remarks on them.

From theſe experiments it would ſeem natural to ſuppoſe that fixed air was the *cauſe* of fermentation, contrary to what has been already laid down. But in fact there is not any contradiction here to the poſition juſt mentioned; for the quantity of fixed air introduced into the liquor in Mr Henry's experiments was too great for it to contain. Some part of the latent heat by which the elaſticity of that fluid is produced may likewiſe have been abſorbed, and diſpoſed the liquor to run into the fermenting ſtate ſooner than it would otherwiſe have done. Or, perhaps, when any fluid ſubſtance of the aqueous kind contains an extraordinary proportion of fixed air, it may be thus inclined to run into the fermentative proceſs, by ſome diſpoſition of the air itſelf to reaſſume its elaſtic ſtate. This ſeems probable from Mr Henry's experiments with Pyrmont water. Having made ſome punch with an artificial water of this kind, he put a pint of it into a quart bottle and ſtopped it with a cork. On opening it three or four days after, he found that it creamed and mantled like the briſkeſt bottled cyder; ſo that it was taken for ſome delicious liquor hitherto unknown. This length of time he found was neceſſary to give the briſkneſs juſt mentioned to the fluid; for artificial Pyrmont water itſelf aſſumes a briſk and ſparkling appearance after being kept three or four days, though it has it not at firſt, unleſs a very great quantity of air be forced into it at its preparation. In like manner a quantity of whey, impregnated with fixed air, was changed into a briſk and ſparkling vinous liquor by keeping for ſome time in a botttle looſely corked.

On certain ſubſtances, however, both fluid and ſolid, fixed air hath a different effect. Thus, when mixed with alkaline ſalts, whether fixed or volatile, fluid or ſolid, it firſt neutraliſes, and then renders them acid, without the leaſt tendency to fermentation, unleſs an acid be added. Then indeed a great efferveſcence will enſue; but this, as we have already ſaid, is not a true fermentation. On calcareous earths its effect is ſomewhat ſingular: for theſe earths, when pure, are ſoluble in water; when joined with a certain proportion of fixed air, they become inſoluble; and with an over-proportion they become ſoluble again; but none of them ſhow any diſpoſition to fermentation, though kept ever ſo long in either ſtate. As water therefore contains a great quantity of latent heat which it readily parts with, the probability ſtill is that a diſpoſition to unite with the ſolid part of fixed air exiſts in that element, rather than to remain combined with the water. It is likewiſe well well known that all fermentable ſubſtances, ſuch as the juices of ripe fruits, ſugar, &c. contain much fixed air, and therefore fall ſpontaneouſly into fermentation when kept in a gentle warmth. This laſt circumſtance ſupplies a quantity of ſenſible heat, or elementary fire acting in its expanſive form, which the water more readily parts with than that which acts upon its own particles in ſuch a manner as to keep them eaſily moveable upon one another, and thus occaſion its fluidity. Other ſubſtances contain leſs fixed air, as infuſion of malt, potatoes, turnips, &c. whence it is neceſſary to add an extraordinary quantity to them, either inveloped in mucilaginous matter which is analogous to yeaſt, or pure as was done by Mr Henry.

6
Dr Penington's opinion.

7
His experiments on the fermentation of bread.

Thus we may ſuppoſe fermentation, to conſiſt in the action of elementary fire expanding the fixed air naturally contained in the fluid, or artificially introduced into it; in conſequence of which certain changes are produced in the nature of the fluid itſelf; and it becomes a vinous, acetous, or putrid liquor, according to the degree of action which takes place. This ſeems to coincide with the opinion of Dr Penington of Philadelphia, who, in his inaugural diſſertation on this ſubject, makes a change of the ſenſible qualities of the ſubſtance the only criterion of fermentation. Hence he denies that any true fermentation exiſts in the raiſing of bread as is commonly ſuppoſed; and indeed his arguments on this ſubject ſeem deciſive. To aſcertain this, he put into a retort ſome dough which had been raiſed in three quarters of an hour; and, on applying a gentle heat, ſome aqueous liquid came over, which did not ſhow the leaſt veſtige of vinous ſpirit, though the remainder of the ſame dough afforded a good and well fermented bread. On adding a little water to the dough which remained in the retort, and letting the mixture ſtand in a gentle warmth for nine hours, no ſign of fermentation appeared; but in 16 hours the proceſs ſeemed to have been going on for ſome time; and on diſtillation yielded a ſmall quantity of vinous ſpirit. Hence it appears that flour requires more than nine hours before it ferments; but as bread frequently riſes in one hour, the proceſſes muſt ſome how or other be eſſentially different." From a variety of facts (ſays our author), 8 His explanation of the proceſs

thor), I am induced to give the following explanation of the proceſs (making of bread). Yeaſt is a fluid containing a large quantity of fixed air or aerial acid; and the proportion is greater as the fluid is colder. As ſoon as the yeaſt is mixed with the dough, heat is applied; this extricates the air in an elaſtic ſtate; and as it is now diffuſed through every particle of dough, every particle muſt be raiſed; the viſcidity of the maſs retains it: it is now baked, and a ſtill greater quantity of air is extricated by the increaſed heat; and as the cruſt forms, the air is prevented from eſcaping; the water is diſſipated: the loaf is rendered ſomewhat dry and ſolid; and between every particle of bread we find a particle of air, as appears from the ſpongy appearance of the bread, owing to the apparent vacancies which the air had made by inſinuating itſelf into it." This explanation he finds alſo confirmed by what is called the *falling* of bread after it has once been raiſed; and which takes place ſo rapidly, that we cannot ſuppoſe the proceſs of fermentation to have been finiſhed in the time: nay, bread will fall before we are warranted from his experiment to ſay that the fermentation is well begun; for this, as we have ſeen, required between 9 and 16 hours.

That bread is raiſed, not by a proper fermentation, but by a mere effervеſcence or eſcape of fixed air, is likewiſe evident from ſeveral facts mentioned by Dr Pennington. In Philadelphia, the bakers find ſome difficulty in getting good yeaſt in the ſummer-time, on account of the heat of the weather, which very ſoon turns it ſour. In this caſe, they diſſolve a ſmall quantity of potaſh in water, and mix it with their yeaſt; when the effervеſcence produced between the acid and alkali produces ſuch a diſcharge of fixed air, as raiſes the bread in leſs than ten minutes. He informs us alſo, on the authority of Dr Ruſh, profeſſor in the college of Philadelphia, that "near Saratoga there are two mineral ſprings, the waters of which have all the properties of the famous Pyrmont water, being highly impregnated with fixed air. When this water is mixed with flour into dough, it is ſufficient, without yeaſt, to make a very light and palatable bread." A third fact is ſtill more deciſive. "I procured (ſays the Doctor) ſome nice cryſtals of the ſalt formed by the foſſile alkali and fixed air, and diſſolved them in water ſufficient to make a ſmall loaf of bread. To this I added a little of the marine acid, commonly called ſpirit of ſea-ſalt; fixed air was generated, but was abſorbed by the cold water; it was then mixed with flour, ſet in a warm place to riſe, and ſhortly after baked; and I had the exquiſite pleaſure to obtain a tolerably light loaf of bread, ſuch as any one would have ſuppoſed to have been fermented, which was ſeaſoned by the ſea-ſalt; formed by the union of the foſſile alkali and ſpirit of ſea-ſalt; whilſt the fixed air of the foſſile alkali was diſengaged, in order to raiſe it.

9 Other facts in confirmation of his opinion.

To theſe inſtances mentioned by our author we ſhall add two others, which ſhow that fixed air is not even neceſſary to the raiſing of bread; and of conſequence we cannot ſuppoſe that fermentation, which produces a great quantity of it, is the foundation of the proceſs. One is, that eggs, when beaten into a froth, are ſometimes made uſe of for raiſing bread; but more eſpecially for puddings, &c. in which they perform an operation ſimilar to that of raiſing and rendering bread light and ſpongy. This is done by the rarefaction of the particles of air enveloped among the glutinous particles of the egg: and hence ſnow, on account of its porous and ſpongy nature, containing a great quantity of air enveloped among its particles, will do the ſame thing. This laſt particular was lately publiſhed by Dr Rotheram of Newcaſtle.

10 His obſervations on Mr Henry's experiments.

With regard to the other experiments of Mr Henry, they ſeem to Dr Pennington not to be altogether concluſive. He doubts the juſtice of Mr Henry's idea, "that *wort* cannot be brought into the vinous fermentation without the addition of a ferment." When we conſider the analogy betwixt the infuſion of malt and other fermentable liquids, the Doctor ſuppoſes that wort, as well as they, might ſpontaneouſly fall into a ſtate of fermentation. He ſays indeed, that he has not yet been able to diſprove the idea by experiment: but Captain Cook has already made the experiment, and the event has decided the matter in the Doctor's favour*. We are told by that celebrated navigator, that the inſpiſſated wort would have anſwered the purpoſe excellently, provided it could have been kept from fermentation in its inſpiſſated ſtate. But this was found impoſſible; of conſequence we muſt conclude, that wort, as well as other liquors, will fall into a ſtate of fermentation ſpontaneouſly, though perhaps not ſo readily, or with ſuch a ſmall degree of heat, as other fermentable liquors. Hence we are not altogether certain, as Dr Pennington hints, whether the fermentation in Mr Henry's experiments might not have taken place without it. "In the memoir (Mr Henry's) abovementioned, ſays the Doctor, the author ſeems to think, that *fixed air* is the true cauſe of fermentation in vinous liquors; and he tells us of the excellent taſte afforded to punch by being impregnated with it. Fixed air, it is well known, improves the *taſte* of liquors; but we cannot ſuſpect that it made the punch ferment in his experiment: but he tells us, that he had made an artificial yeaſt; that with this yeaſt he made beer (perhaps he might have made it without it) and vinegar; and that he fermented bread with it. As for its fermenting bread, we might readily allow that it would raiſe bread, upon the principles already laid down: and when he tells us how quick the fermentation takes place in his liquors when expoſed to a gentle heat, may we not juſtly ſuppoſe, that the warmth extricated the fixed air that he had artificially combined with it, and that from this phenomenon alone he had ſuppoſed fermentation to be going on in them? Fixed air is the cauſe of the briſkneſs, pungent taſte, and ſparkling appearance, of vinous liquors; and it is remarkable, that, in equal circumſtances, the colder they are, the more air they contain. It is alſo a curious fact, that the fixed air in liquors muſt be in a peculiar ſtate, otherwiſe they do not poſſeſs that briſkneſs or pungency we ſpoke of; in fact, it muſt be on the point of aſſuming its elaſtic form; hence liquors are not ſo briſk in cold as in warm weather; and a connoiſſeur in porter, for inſtance, will tell you, that a bottle ſhall open very briſkly in a warm day; and upon the coming on of cold weather, all the reſt ſhall be flat and dead; but let them be corked up and kept in a warm room for a few days, they will all recover their former briſkneſs; nay, I have ſeen a bottle opened in a cold day, that has been quite vapid, which was made briſk and lively by corking it up tight again, and ſetting it for ten or twelve minutes in a baſon of water a little more than milk warm.

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* See the article *Cook*, vol. v. p. 394. col. 2.

11 His theory of fermentation.

Our author's theory of fermentation is to the following purpoſe. 1. The heat occuring in the mixture, he explains on Dr Black's principle of latent heat. 2. In the fermenting proceſs, he ſuppoſes the inflammable part of the mixture to have a tendency to combine with pure air, and thus to form what is called *fixed air*. 3. The pure air is ſuppoſed to be derived from the atmoſphere, while inflammable air is furniſhed by the fermenting liquor. 4. The fixed air found in ſuch plenty above the liquid while in a ſtate of fermentation, does not exiſt in it originally, but is formed by a combination of the two ingredients juſt mentioned. 5. On theſe principles the heat which takes place in the mixture may be particularly explained in the following manner. "Suppoſe that the quantity of heat in the two airs before combination was in each as *ten*; or, in other words, that they were capable of containing that quantity in a latent ſtate eſſential to their exiſtence as matter in that form; when they unite, they form a very different kind of air, which is not capable of combining with ſo much heat, and perhaps quite foreign to its exiſtence as that kind of matter: we will ſuppoſe then, that it can combine but with a quantity of that heat as *five*; the conſequence muſt then be, that there is a quantity of redundant heat, as *fifteen*; and there being no bodies at hand undergoing any changes in their properties, by which their capacities to unite with heat as a principle are increaſed, it becomes *mechanically diffuſed* among thoſe bodies which are neareſt to it; it gives the redundant heat to the hand," &c.

12 General remark.

We ſhall conclude this article with one obvious remark, viz. that the diſpute concerning Mr Henry's method of inducing fermentation, may be eaſily decided by a comparative trial. Let, for inſtance, two gallons of wort, the quantity he uſed in his experiment, be put into a certain veſſel without addition, and kept in a moderate heat for a certain time; take other two gallons, and impregnate the whole or any part of it with fixed air, according to Mr Henry's method: put the whole then into a veſſel ſimilar to the other, and ſet it in the ſame place; and if the fermentation begins in the one impregnated with fixed air ſooner than the other, we have good reaſon to believe that the fixed air was the cauſe of its doing ſo. This experiment is eaſily made, and muſt be of conſiderable importance to the public: for as Mr Henry juſtly obſerves, his experiments "may be of extenſive utility, and contribute to the accommodation, the pleaſure, and the health of men in various ſituations, who have hitherto been precluded in a great meaſure from the uſe of fermented liquors; and be the means of furniſhing important articles of diet and of medicine." Even as matters ſtand, we muſt conſider this end as accompliſhed; though, if the mere circumſtances of heat, without fixed air, would bring on fermentation, it would undoubtedly render the proceſs conſiderably eaſier, by ſaving the trouble of impregnating the liquor with fixed air. With regard to bread, his method ſeems to be entirely deciſive.

The buſineſs of fermentation is one of the great preparations to the diſtillery. What we uſually call vinous fermentation in particular, is the kind in which it is principally concerned. By this we uſually underſtand that phyſical action, or inteſtine commotion of the parts of a vegetable juice, tincture, or ſolution, which render them fit to yield an inflammable ſpirit on diſtillation.

This fermentation in the hands of the diſtiller differs from the common one that is uſed in the making of potable vinous liquors, as being much more violent, tumultuary, active, and combinatory than that. A large quantity of yeaſt, or other ferment, is added to the diſtiller's fermentation; the free air is admitted, and every thing is contrived to quicken the operation, ſo that it is ſometimes finiſhed in two or three days. This great diſpatch, however neceſſary to the large dealer, has its inconveniencies attending it; for the ſpirit is by this means always fouler, more groſs, and really terreſtrial, than it would have been if the liquor had undergone a proper fermentation in a ſlower manner. It alſo ſuffers a diminution in its quantity, from the violent and tumultuary admiſſion, conflict, and agitation of the free air, both in the body and upon the ſurface of the liquor, eſpecially if the liquor be not immediately committed to the ſtill as ſoon as the fermentation is fairly ſlacked or fully ended. It is a very difficult taſk to render the buſineſs of fermentation at once perfect and advantageous. To ferment, in perfection, neceſſarily requires length of time and careful attendance, and cloſe veſſels, beſides ſeveral other articles of nice management, which cannot be expected to be received and practiſed in the large way, on account of the trouble and expence, unleſs it could be proved to the diſtillers, as poſſibly it ſome time may, that the quantity of ſpirit would be ſo much greater from the ſame quantity of materials managed thus, than by the common way, that it will more than pay its own expence: to which may be added, the very well known advantage of the ſpirit thus procured by perfect fermentation, being much finer than that obtained in the common way. Till this ſhall be made out, it may not be amiſs to try how much of the more perfect art of vinous fermentation is profitably practicable by the diſtiller in the preſent circumſtances of things. The improvements to be made in this affair will principally regard, 1. The preparation or previous diſpoſition of the fermentable liquor. 2. The additions tending to the general or ſome particular end. 3. The admiſſion or excluſion of the air. 4. The regulation of the external heat or cold. And, 5. A ſuitable degree of reſt at laſt. When proper regard is had to theſe particulars, the liquor will have its due courſe of fermentation, and it will thence become fit to yield a pure and copious inflammable ſpirit by diſtillation. The tincture, ſolution, or liquor, intended for fermentation, for the ſtill, ſhould be conſiderably thin and aqueous. That ſort of richneſs there is in the twelve-ſhilling ſmall beer, is the utmoſt that ought to be allowed to it. This property not only fits it to ferment readily, but alſo to yield a larger quantity in proportion of a pure vinous ſpirit, than it would do if it were more rich or clammy: the groſs, foul, viſcid, and earthy particles of ſuch glutinous liquors, being after fermentation apt to riſe up with the boiling heat which much neceſſarily be employed to raiſe the ſpirit ; and the ſpirit thus of courſe comes over foul and fetid. There is alſo another advantage attending the thinneſs of this liquor, which is, that it will ſooner become fine by ſtanding before fermentation ; whence it may be commodiouſly drawn off from its feces or bottom, which muſt always, in caſe of corn, malt, or any other meally ſubſtance, be kept out where the purity of the ſpirit is conſulted. A certain degree of warmth ſeems neceſſary in all the northern climates, to all ſorts of artificial liquors intended for immediate fermentation, eſpecially in winter ; but the natural juices of vegetables, which have never been inſpiſſated, as that of grapes and other fruits when fully ripened, will uſually ferment, as ſoon as they are expreſſed, without any external aſſiſtance. But as a certain degree of inſpiſſation prevents all tendency to fermentation in all vegetable juices, though otherwiſe ſtrongly diſpoſed to ferment ; ſo a long continuance, or an increaſe of the inſpiſſating heat, eſpecially if it acts immediately through a metalline or ſolid body upon the juice, will deſtroy its fermenting property ; and it will do this the more effectually, as the heat employed approaches to that of ſcorching, or the degree capable of giving an empyreuma—After the ſame manner, ſeveral experiments make it appear, that there is a certain degree of heat, the continuance or leaſt increaſe of which proves detrimental or deſtructive to fermentation, as there is another which in a wonderful manner encourages and promotes it. Theſe two degrees of heat ought to be carefully noted and ſettled by the thermometer, or other certain methods, for philoſophical and chemical uſes ; but for common, or all economical occaſions, they may be limited to what we call a tepid and fervid heat. A fervid heat is the bane of all vinous fermentation ; as a tepid one, or rather imperceptible warmth, is the great promoter of them. In this neutral ſtate, therefore, with proper contrivances to preſerve and continue it, the liquor is to be put into a ſuitable veſſel for fermentation ; at which time, if it works not of itſelf, it muſt be quickened by additions ; and, in general, by ſuch things as are commonly called *ferments*.

The juices of plants are ſtrangely altered by fermentation ; and are ſuſceptible of many, and thoſe very various, changes from it. And it is not only the juices of fruits that are thus to be wrought upon, as thoſe of apples, pears, grapes, and the like, in the common way ; but there is an artificial change to be made in the ſeeds of plants by what is called *malting*. And it is not grain alone that is thus to be wrought upon, but any other ſeed whatever may be made to yield its juices and virtues freely to water by this proceſs. The juices of roots alſo, for inſtance that of liquorice, will be wrought upon in the ſame manner ; and the juices of the bodies of trees, as of the birch, and the like. If in the month of March a hole be bored into the body of a birch-tree, and this hole be ſtopped with a cork, thro' the middle of which there is thruſt a quill open at both ends, the juices of the tree will drop out at the quill at the rate of a large drop every ſecond of a minute, and a great quantity will in time be obtained in this manner. This liquour is not unpleaſant to the taſte, and looks tolerably clear, reſembling water into which a little milk had been ſpilt. There are many ways of fermenting this juice, by all of which it is converted into a ſort of wine. Theſe are well known. But there is another remarkable property in our maples, both the common ſmall kind and the great one, which we call the ſycamore : theſe being tapped in the ſame manner, will bleed freely in winter ; and their juices, after a hard froſt breaks, will flow out in ſo copious a manner as is ſcarce to be conceived. The willow, the poplar, and the walnut-tree, will all bleed alſo ; and fermentation, of which their ſeveral juices are eaſily ſuſceptible, will turn them all into palatable and ſtrong wines.

FERN, FILIX, in botany. See FILICES.

Fern is very common in dry and barren places. It is one of the worſt weeds for lands, and very hard to deſtroy where it has any thing of a deep ſoil to root in. In ſome grounds, the roots of it are found to the depth of eight feet. One of the moſt effectual ways to deſtroy it is often mowing the graſs ; and, if the field is ploughed up, plentiful dunging thereof is very good : but the moſt certain remedy for it is urine. However, fern, cut while the ſap is in it, and left to rot upon the ground, is a very great improver of land.

In ſome places in North-Britain, the inhabitants mow it green ; and, burning it to aſhes, make thoſe aſhes up into balls with a little water. They then dry them in the ſun, and make uſe of them to clean their linen with ; looking upon it to be near as good as ſoap for that purpoſe.

Male FERN. See POLYPODIUM.

Female FERN. See PTERIS.

FERNANDO, or FERNANDES, an iſland in the Pacific ocean. See *Juan Fernandes*.

FERNELIUS (John), phyſician to Henry II. king of France, was born in Picardy, in the latter end of the 15th, or the beginning of the 16th century. Being ſent to Paris to ſtudy rhetoric and philoſophy, he applied himſelf in a moſt intenſe manner. All other pleaſure was inſipid to him. He cared neither for play nor for walking, nor for entertainments, nor even for converſation. He read Cicero, Plato, and Ariſtotle. The reading of Cicero procured him this advantage, that the lectures he read on philoſophical ſubjects were as eloquent as thoſe of the other maſters were barbarous at that time. He alſo applied himſelf very earneſtly to the mathematics. This continual ſtudy drew upon him a long fit of ſickneſs, which obliged him to leave Paris. On his recovery, he returned thither with a deſign to ſtudy phyſic ; but before he applied himſelf entirely to it, he taught philoſophy in the college of St Barbara. After this he ſpent four years in the ſtudy of phyſic ; and taking a doctor's degree, confined himſelf to his cloſet, in order to read the beſt authors, and to improve himſelf in the mathematics ; that is, as far as the buſineſs of his profeſſion would ſuffer him. Never was a man more diligent than Fernel. He uſed to riſe at four o'clock in the morning, and ſtudied till it was time either to read lectures or to viſit patients. He then examined the urine that was brought him ; for this was the method of thoſe times, with regard to the poor people, who did not ſend for the phyſician. Coming home to dine, he ſhut himſelf up among his books till they called him down to table. Riſing from table, he returned to his ſtudy, which he did not leave without neceſſary occaſions. Coming home at night, he did juſt as at noon : he ſtaid among his books till they called him to ſupper ; returned to them the moment he had ſupped; and did not leave them till eleven o'clock, when he went to bed. In the courſe of theſe ſtudies, he contrived mathematical inſtruments, and was at great charges in making them. But his wife murmuring at the expence, he diſmiſſed his inſtrument-makers, and applied himſelf in good earneſt to practice phyſic. But as viſiting patients did not employ his whole time, he read public lectures upon Hippocrates and Galen. This ſoon gained him a great reputation through France and in foreign countries. His buſineſs increaſing, he left off reading lectures; but as nothing could make him ceaſe to ſtudy in private, he ſpent all the hours he could ſpare in compoſing a work of phyſic, intitled *Phyſiologia*, which was ſoon after publiſhed. He was prevailed with to read lectures upon this new work, which he did for three years: and undertaking another work, which he publiſhed, *De venæ ſectione*, he laid himſelf under a neceſſity of reading lectures ſome years longer, in order to explain this new book to the youth. While he was thus employed, he was ſent for to court, in order to try whether he could cure a lady, whoſe recovery was deſpaired of. He was ſo happy as to cure her; which was the firſt cauſe of that eſteem which Henry II. who was then but dauphin, and was in love with that lady, conceived for him. This prince offered him, even then, the place of firſt phyſician to him; but Fernel, who infinitely preferred his ſtudies to the hurry of a court, would not accept the employment. When Henry came to the throne, he renewed his intreaties: but Fernel repreſented, that the honour which was offered to him was due, for ſeveral reaſons, and as an hereditary right, to the late king's phyſician; and that, as for himſelf, he wanted ſome time to make experiments concerning ſeveral diſcoveries he had made relating to phyſic. The king admitted this: but as ſoon as Francis I.'s phyſician died, Fernel was obliged to go and fill his place at Henry II.'s court. And here juſt the contrary to what he dreaded came to paſs; for he enjoyed more reſt and more leiſure at court than he had done at Paris; and he might have conſidered the court as an agreeable retirement, had it not been for the journeys which the new civil wars obliged the king to take. He died in 1558, leaving behind him a great many works, beſides what have been mentioned; as *De abditis rerum cauſis*, ſeven books of Pathology, a book on Remedies, &c. They have been printed ſeveral times; with his life prefixed, written by William Plantius his diſciple.

FERONIA, the pagan goddeſs of woods and orchchards. This deity took her name from the town Feronia, ſituated at the foot of mount Soracte in Italy, where was a wood and temple conſecrated to her. That town and wood are mentioned by Virgil, in the catalogue of Turnus's forces. Strabo relates, that thoſe who ſacrificed to this goddeſs, walked barefoot upon burning coals, without being hurt. She was the guardian deity of freed-men, who received their cap of liberty in her temple.

FERRARA, a city of Italy, in the territory of the pope, capital of a dutchy of the ſame name. It is ſeated in an agreeable and fertile plain; watered by the river Po, which is a defence on one ſide; and on the other is encompaſſed by a ſtrong wall and deep broad ditches full of water, as well as by a good citadel, finiſhed by pope Paul. In the middle of the city is a magnificent caſtle, which was formerly the palace of the dukes, and is not now the leaſt ornament of Ferrara. It is quite ſurrounded with water; and the arſenal which is near it, deſerves the obſervation of travellers. Over-againſt the palace is the duke's garden; with a park called *Belvidere* on account of its beauty. Behind the garden there is a palace built with white marble, called the *palace of diamonds*, becauſe all the ſtones are cut diamond faſhion.

Ferrara had formerly a conſiderable trade; but it is now almoſt deſerted, being very poor, inſomuch that there is hardly a perſon to be ſeen in the ſtreets. This is owing to the exactions of the popes. The fortifications are now neglected, and the ancient univerſity is dwindled into a wretched college of the Jeſuits. However, in 1735, it was advanced to an archbiſhopric by pope Clement XII. The country about it is ſo marſhy, that a ſhower or two of rain renders the roads almoſt impaſſable. It is 24 miles north-eaſt of Bologna, 38 north-weſt of Ravenna, 70 north-by-weſt of Florence, and 190 north of Rome. E. long. 12. 14. N. Lat. 44. 36.

Ferrara, the duchy of; a province in the pope's territory, bounded on the north by the ſtate of Venice, on the weſt by the duchies of Mantua and Mirandola, on the ſouth by the Boulogneſe and by Romania, of which it was formerly a part, and on the eaſt by the Gulph of Venice. It is 50 miles in length, and 43 in breadth along the coaſt; but grows narrower and narrower towards the Mantuan. This country is almoſt ſurrounded by the branches of the Po, which often overflow the country, and form the great moraſs of Comachio, which has a bad effect on the air. It is thin of people, and indifferently cultivated, though fit for corn, pulſe, and hemp. The Po and the lake of Comachio yield a large quantity of fiſh. Ferrara is the capital town; beſides which, there are Arano, Comachio, Magnavacca, Belriguardo, Cento, Buendeno, and Ficherola. This duchy was formerly poſſeſſed by the houſe of Eſte. But the pope took poſſeſſion of it in 1598, after the death of Alphonſo II. duke of Ferrara, it being a fief of the church.

FERRARIA, in botany, : A genus of the triandria order, belonging to the gynandria claſs of plants; and in the natural method ranking under the ſixth order, *Enſatæ*. The ſpathæ are uniflorous; the petals ſix in number, and wavingly curled; the ſtigmata cucullated or cowled; the capſule is trilocular, inferior. There are two ſpecies, natives of the Cape of Good Hope. There is a great ſingularity in the root of one of theſe ſpecies, that it vegetates only every other year, and ſometimes every third year; in the intermediate time it remains inactive, though very ſound and good.

FERRARS (George), a lawyer, poet, hiſtorian, and accompliſhed gentleman, was deſcended from an ancient family in Hertfordſhire, and born about the year 1510, in a village near St Alban's. He was educated at Oxford, and thence removed to Lincoln's inn; where applying with uncommon diligence to the ſtudy of the law, he was ſoon diſtinguiſhed for his elocution at the bar. Cromwell earl of Eſſex, the great miniſter of Henry VIII. introduced him to the king, who employed him as his menial ſervant, and, in 1535, gave him a grant of the manor of Flamſtead in his native county. This is ſuppoſed to have been a profitable eſtate; nevertheleſs, Mr Ferrars being a gay courtier, and probably an expenſive man, about ſeven years after was taken to execution by a ſheriff's officer for a debt of 200 merks and lodged in the compter. Being at this time member for Plymouth, the houſe of commons immediately interfered, and he ſoon obtained his liberty. He continued in favour with the king to the end of his reign, and in that of Edward VI. he attended the lord protector Somerſet as a commiſſioner of the army in his expedition to Scotland in 1548. In the ſame reign, the young king being then at Greenwich, Mr Ferrars was proclaimed *lord of miſrule*, that is, prince of ſports and paſtimes; which office he diſcharged during 12 days, in Chriſtmas holidays, to the entire ſatisfaction of the court. This is all we know of Mr Ferrars; except that he died in 1579, at Flamſtead in Hertfordſhire, and was buried in the pariſh-church. He is not leſs celebrated for his valour in the field, than for his other accompliſhments as a gentleman and a ſcholar. He wrote, 1. Hiſtory of the Reign of Queen Mary; publiſhed in Grafton's chronicle, 1569, fol. 2. Six tragedies, or dramatic poems; publiſhed in a book called the *Mirror for Magiſtrates*, firſt printed in 1559, afterwards in 1587, and again in 1610.

FERRARS (Henry), a Warwickſhire gentleman of a good family, was eminent in antiquities, genealogies, and heraldry. Mr Wood ſays, that out of the collections of this gentleman, Sir William Dugdale laid part of the foundation of his celebrated *Antiquities of Warwickſhire*. Cambden alſo makes honourable mention of his aſſiſtance in relation to Coventry. Some ſcattered poems of his were publiſhed among others in the reign of queen Elizabeth; and he died in 1633.

FERRET, in zoology. See MUSTELA.

FERRETS, among glaſs-makers, the iron with which the workmen try the melted metal, to ſee if it be fit to work.—It is alſo uſed for thoſe irons which make the rings at the mouth of the bottles.

FERRETTO, in glaſs-making, a ſubſtance which ſerves to colour glaſs.

This is made by a ſimple calcination of copper, but it ſerves for ſeveral colours; there are two ways of making it. The firſt is this. Take thin plates of copper, and lay them on a layer of powdered brimſtone, in the bottom of a crucible; over theſe lay more brimſtone, and over that another layer of the plates, and ſo on alternately till the pot is full. Cover the pot, lute it well, place it in a wind furnace; and make a ſtrong fire about it for two hours. When it is taken out and cooled, the copper will be found ſo calcined, that it may be crumbled to pieces between the fingers like a friable earth. It will be of a reddiſh, and, in ſome parts, of a blackiſh colour. This muſt be powdered and ſifted fine for uſe.

Another way of making ferretto is as follows. Make a number of ſtratifications of plates of copper and white vitriol alternately in a crucible; which place on the floor of the glaſs furnace near the eye; and let it ſtand there three days; then take it out, and make a new ſtratification with more freſh vitriol; calcine again as before. Repeat this operation ſix times, and a moſt valuable ferretto will be obtained.

FERRI (Ciro) a ſkilful painter, born of a good family at Rome, in 1634. He was bred under Peter Cortona; and the works of the ſcholar are often miſtaken for thoſe of the maſter. The great duke of Tuſcany nominated him chief of the Florentine ſchool; and he was as good an architect as a painter. He died in 1689.

FERRO, (W. Long. 19. N. Lat. 28), the moſt weſterly of the Canary iſlands, near the African coaſt, where the firſt meridian was lately fixed in moſt maps; but now, the geographers of almoſt every kingdom make their reſpective capitals the firſt meridian, as the Engliſh do London. It is a dry and barren ſpot, affording no water except what is ſupplied in a very ſurpriſing manner by a tree which grows in theſe iſlands. See FOUNTAIN-*Tree*.

FERRO, *Faro*, or *Feroe Iſlands*; a cluſter of little iſlands lying in the Northern ocean, between 61° and 63° N. Lat. and between 5° and 8° W. Long. They belong to Denmark. There are 17 which are habitable; each of which is a lofty mountain ariſing out of the waves, divided from the others by deep and rapid currents. Some of them are deeply indented with ſecure harbours; Providence ſeeming to have favoured mankind with the ſafeſt retreats in the moſt boiſterous ſeas. All are very ſteep, and moſt of them faced with moſt tremendous precipices. The ſurface of the mountains conſiſts of a ſhallow ſoil of remarkable fertility; for barley, the only corn ſown here, yields above 20 for one; and the graſs affords abundant paſturage for ſheep. The exports are, ſalted mutton and tallow, gooſe-quills, feathers, and eider down; and, by the induſtry of the inhabitants, knit woollen waiſtcoats, caps, and ſtockings. No trees beyond the ſize of juniper or ſtunted willows will grow here: nor are any wild quadrupeds to be met with except rats and mice, originally eſcaped from the ſhipping. Vaſt quantities of ſea-fowl frequent the rocks; and the taking of them furniſhes a very perilous employment to the natives, as deſcribed under the article *BIRD-Catching*.

The ſea which ſurrounds theſe iſlands is extremely turbulent. The tides vary greatly on the weſtern and eaſtern ſides. On the firſt, where is received the uninterrupted flood of the ocean from the remote Greenland, the tide riſes ſeven fathoms; on the eaſtern ſide it riſes only three. Dreadful whirlwinds, called by the Danes *oes*, agitate the ſea to a ſtrange degree; catch up a vaſt quantity of water, ſo as to leave a great temporary chaſm in the ſpot on which it falls, and carries away with it, to an amazing diſtance, any fiſhes which may happen to be within reach of its fury. Thus great ſhoals of herrings have been found on the higheſt mountains of Feroe. It is equally reſiſtleſs on land; tearing up trees, ſtones, and animals, and carrying them to very diſtant places.

Among the numerous whirlpools of theſe ſeas, that of Suderoe, near the iſland of the ſame name, is the moſt noted. It is occaſioned by a crater 61 fathoms in depth in the centre, and from 50 to 55 on the ſides. The water forms four fierce circumgirations. The point they begin at is on the ſide of a large baſon, where commences a range of rocks running ſpirally, and terminating at the verge of the crater. This range is extremely rugged, and covered with water from the depth of 12 to 8 fathoms only. It forms four equidiſtant

diſtant wreaths, with a channel from 35 to 20 fathoms in depth between each. On the outſide, beyond that depth, the ſea ſuddenly ſinks to 80 and 90. On the ſouth border of the baſon is a lofty rock, called *Sumboe Munk,* noted for the multitude of birds which frequent it. On one ſide, the water is only 3 or 4 fathoms deep; on the other 15. The danger at moſt times, eſpecially in ſtorms, is very great. Ships are irreſiſtibly drawn in; the rudder loſes its power; and the waves beat as high as the maſts; ſo that an eſcape is almoſt miraculous: yet at the reflux, and in very ſtill weather, the inhabitants will venture in boats for the ſake of fiſhing.

FERROL, a ſea-port town of Spain, in the province of Gallicia, ſeated on a bay of the Atlantic ocean. It has a good harbour, and is frequented by the Spaniſh fleet in time of war. W. Long. 8. 46. N. Lat. 43. 26.

FERRUGINOUS, any thing partaking of iron, or which contains particles of that metal.

FERRUGO, RUST. See RUST.

FERRUM, IRON. See IRON.

FERRY, a convenient place for a paſſage-boat, on a frith or river for carrying paſſengers, horſes, &c. over the ſame for a reaſonable toll.

FERTILITY, that quality which denominates a thing fruitful or prolific.

Nothing can produce fertility in either ſex, but what promotes perfect health: nothing but good blood, ſpirits, and perfect animal functions, that is, high health, can beget perfect fecundity; and therefore, all means and medicines; all noſtrums and ſpecifics, to procure fertility, different from thoſe which procure good blood and ſpirits, are arrant quackery. Dr Cheyne ſays, that water-drinking males are very rarely infertile; and that if any thing in nature can prevent infertility, and bring fine children, it is a milk and ſeed diet perſevered in by both parents.

To increaſe the fertility of *vegetables,* ſays lord Bacon, we muſt not only increaſe the vigour of the earth and of the plant, but alſo preſerve what would otherwiſe be loſt: whence he infers, that there is much ſaved by ſetting, in compariſon of ſowing. It is reported, continues he, that if nitre be mixed with water to the thickneſs of honey, and after a vine is cut, the bud be anointed therewith, it will ſprout within eight days. If the experiment be true, the cauſe may be in the opening of the bud, and contiguous parts, by the ſpirit of the nitre; for nitre is the life of vegetables.

How far this may be true, is not perhaps ſufficiently ſhown, notwithſtanding the experiments of Sir Kenelm Digby and M. Homberg. Conſult Mr Evelyn's Sylva, the Philoſophical Tranſactions, the French Memoirs, and Dr Stahl's Philoſophical Principles of Chemiſtry; but a proper ſet of accurate experiments ſeems ſtill wanting in this view.

FERULA, a little wooden pallet or ſlice, reputed the ſchoolmaſter's ſceptre, wherewith he chaſtiſes the boys, by ſtriking them on the palm of the hand. The word is Latin, and has alſo been uſed to denote the prelate's croſier and ſtaff. It is ſuppoſed to be formed of the Latin, *ferire,* "to ſtrike." Under the eaſtern empire, the ferula was the emperor's ſceptre, as is ſeen on divers medals; it conſiſts of a long ſtem or ſhank, and a flat ſquare head. The uſe of the ferula is very ancient among the Greeks, who uſed to call their princes ναρθηκοφοροι, q. d. "ferula-bearers."

In the ancient eaſtern church, ferula or *narthex* ſignified a place ſeparated from the church; wherein the penitents or the catechumens of the ſecond order, called *auſcultantes,* ακροαματικοι, were kept, as not being allowed to enter the church; whence the name of the place, the perſons therein being under penance or diſcipline: *ſub* ferula *erant eccleſiæ.*

FERULA, *Fennel-giant,* in botany: A genus of the digynia order, belonging to the pentandria claſs of plants: and in the natural method ranking under the 45th order *Umbellatæ.* The fruit is oval, compreſſed plane, with three ſtriæ on each ſide. There are nine ſpecies; all of them herbaceous perennials, riſing from three to ten or twelve feet high, with yellow flowers. They are propagated by ſeeds, which ſhould be ſown in autumn; and, when planted out, ought to be four or five feet diſtant from each other, or from any other plants; for no other will thrive under their ſhade. The drug aſſafetida is obtained from a ſpecies of ferula; though not peculiarly, being alſo produced by ſome other plants.

FESCENNIA, or FESCENNIUM, (anc. geog.) a town of Etruria, above Falerii; where the Feſcennine verſes were firſt invented. Now *Galeſe,* in the Eccleſiaſtical State, near the Tiber.

FESCENNINE VERSES, in antiquity, were a kind of ſatirical verſes, full of wanton and obſcene expreſſions, ſung or rehearſed by the company, with many indecent geſtures and dances, at the ſolemnization of a marriage among the Romans; (*Hor.* ep. i. lib. v. 145.) The word is borrowed, according to Macrobius, from *faſcinum,* "a charm;" the people taking ſuch ſongs to be proper to drive away witches, or prevent their effect; but its more probable origin is from Feſcennium, a city of Campania, where ſuch verſes were firſt uſed.

FESSE, in heraldry, one of the nine honourable ordinaries. See HERALDRY.

FESSE-Point, is the exact centre of the eſcutcheon. See POINT.

FESSE-Ways, or *in FESSE,* denotes any thing borne after the manner of a feſſe; that is, in a rank acroſs the middle of the ſhield.

Party per FESSE, implies a parting acroſs the middle of the ſhield, from ſide to ſide, through the feſſe point.

FESTI DIES, in Roman antiquity, certain days in the year, devoted to the honour of the gods.

Numa, when he diſtributed the year into 12 months, divided the ſame into the *dies feſti, dies profeſti,* and *dies interciſi.*

The feſti were again divided into days of ſacrifices, banquets, games, and feriæ. See FERIÆ.

The *profeſti* were thoſe days allowed to men for the adminiſtration of their affairs, whether of a public or private nature: theſe were divided into faſti, comitiales, &c. See FASTI, COMITIALES, &c.

The *interciſi* were days common both to gods and men, ſome parts of which were allotted to the ſervice of the one, and ſome to that of the other.

FESTINO, in logic, the third mood of the ſecond figure of the ſyllogiſm, the firſt propoſition whereof is an univerſal negative, the ſecond a particular affirmative, and the third a particular negative; as in the following example:

FES No bad man can be happy.
TI Some rich men are bad men.
NO *Ergo*, ſome rich men are not happy.

FESTIVAL, a time of feaſting: See FEAST.—The term is particularly applied to anniverſary days of civil or religious joy.

FESTOON, in architecture and ſculpture, &c. an ornament in form of a garland of flowers, fruits, and leaves, intermixed or twiſted together.

It is in the form of a ſtring or collar, ſomewhat biggeſt in the middle, where it falls down in an arch; being extended by the two ends, the extremities of which hang down perpendicularly.

Feſtoons are now chiefly uſed in friezes, and other vacant places which want to be filled up and adorned; being done in imitation of the long cluſters of flowers, which the ancients placed on the doors of their temples and houſes on feſtival occaſions.

FESTUCA, FESCUE, in botany: A genus of the digynia order, belonging to the triandria claſs of plants; and in the natural method ranking under the 34th order, *Gramina.* The calyx is bivalved; and the ſpicula or partial ſpike is oblong and a little roundiſh, with the glumes acuminated. There 16 ſpecies; two of which, as being the moſt remarkably uſeful, are deſcribed under the article AGRICULTURE, n° 53—58. Another ſpecies, called *the fluitans*, or *floating feſcue*, from its growing in wet ditches and ponds, is remarkable for the uſes that are made of its ſeeds. Theſe ſeeds are ſmall, but very ſweet and nouriſhing. They are collected in ſeveral parts of Germany and Poland, under the name of *mana ſeeds*; and are uſed at the tables of the great, in ſoups and gruels, on account of their nutritious quality and grateful flavour. When ground to meal, they make bread very little inferior to that in common uſe. The bran, ſeparated in preparing the meal, is given to horſes that have worms; but they muſt be kept from water for ſome hours afterwards. Geeſe are alſo very fond of theſe ſeeds.—Mr Lightfoot recommends this as a proper graſs to be ſown in wet meadows.

FESTUS (Pompeius), a celebrated grammarian of antiquity, who abridged a work of Verrius Flaccus, *De Significatione Verborum*; but took ſuch liberties in caſtration and criticiſing, as, Gerard Voſſius obſerves, are not favourable to the reputation of his author. A complete edition of his fragments was publiſhed by M. Docier in 1681, for the uſe of the Dauphin. Scaliger ſays, that Feſtus is an author of great uſe to thoſe who would attain the Latin tongue with accuracy.

FETLOCK, in the manege, a tuft of hair growing behind the paſtern joint of many horſes; for thoſe of a low ſize have ſcarce any ſuch tuft.

FETTI (Domenico), an eminent painter in the ſtyle of Julio Romano, was born at Rome in 1589, and educated under Ludovico Civoli of Florence. He painted but little for churches, but excelled in hiſtory; his pictures are much ſought after, and are ſcarce. He abandoned himſelf to diſorderly courſes; and put an end to his life, by exceſſes, in the 35th year of his age.

FETUS. See FOETUS.

FEUD, in ancient cuſtoms, is uſed for a capital quarrel or enmity, not to be ſatisfied but with the death of the enemy; and thence uſually called *deadly feud*.—*Feud*, called alſo *feida*, and *feida*, in the original German ſignifies *guerram*, i. e. *bellum*, "war." Lambert writes it *feeth*, and ſaith it ſignifies *capitales inimicitias*, or "implacable hatred."

In Scotland, and the north of England, feud is particularly uſed for a combination of kindred, to revenge the death of any of their blood, againſt the killer and all his race, or any other great enemy.

FEUD *(Feoda)*, the ſame with *Fief*, or *Fee*. See *FEODAL Syſtem*.

FEUDAL, or FEODAL, of or belonging to a feud or fee. See FEODAL.

FEUDATORY, or FEODATORY, a tenant who formerly held his eſtate by feodal ſervice. See *Feodal TENURE*.

FEU-DUTY, in Scots law, is the annual rent or duty which a vaſſal, by the tenor of his right, becomes bound to pay to his ſuperior.

FEU-Holding, in Scots law, is that particular tenure by which a vaſſal is taken bound to pay an annual rent or feu-duty to his ſuperior.

FEVER. See (*Index* ſubjoined to) MEDICINE.

The ancients deified the diſeaſes as well as the paſſions and affections of men. Virgil places them in the entrance into hell, *Æn.* vi. 273. Among theſe, *Fever* had a temple on mount Palatine and two other parts of ancient Rome; and there is ſtill extant an inſcription to this goddeſs. FEBRI. DIVÆ. FEBRI. SANCTÆ. FEBRI. MAGNÆ, CAMIBLA. AMATA. PRO. FILIO. MALE. AFFECTO.

FEVER, in farriery. See there, ſect. viii.

FEVERFEW, in botany. See MATRICARIA.

FEVERSHAM, a town of the county of Kent in England, ſituated on a branch of the river Thames, which is navigable for hoys. It was a royal demeſne A. D. 811, and called in Kenulf's charter the *King's little Town*, though it is now a large one. It was inhabited by the Britons long before the invaſion of Cæſar. In 903, king Athelſtan held a great council here. King Stephen erected a ſtately abbey, 1147, whoſe abbots ſat in parliament; and he was buried in it, together with Maud his queen, and Euſtace his ſon; but of this building two mean gate-houſes are all that now remain. The town was firſt incorporated by the name of the Barons of Feverſham, afterwards by Henry VIII. with the title of the mayor and commonalty; and laſtly by that of the mayor and jurats and commonalty. It is a populous flouriſhing, place, conſiſting chiefly of two long broad ſtreets, with a market-houſe in the centre, built 1574. Its ancient church was rebuilt in 1754, at the expence of 2300 l. but was originally built in Edwards II.'s reign. There is a free grammar-ſchool in the place, built and endowed by Queen Elizabeth in 1582; alſo two charity-ſchools. It is a member of the cinque-port of Dover, and has a manufactory of gunpowder. The London markets are ſupplied from hence with abundance of apples and cherries, and the beſt oyſters for ſtewing. Theſe laſt are alſo fetched away in ſuch quantities by the Dutch that a prodigious number of men and boats are employed here in the winter to drudge for them;

and it is ſaid they carry home as many as amount to above 2000 l. a-year. The fiſhermen will admit none to take up their freedom but married men.

FEVILLEA, in botany: A genus of the pentandria order, belonging to the diœcia claſs of plants; and in the natural method ranking under the 34th order, *Cucurbitaceæ*. The male calyx is quinquefid; the corolla the ſame; there are five ſtamina; and the nectarium conſiſts of five filaments connivent or cloſing together. The female calyx is quinquefied; the ſtyles are three; and the fruit is an hard trilocular apple with an hard bark.

FEVRE (Tonegui le), of Caen in Normandy, born 1615, was an excellent ſcholar in the Greek and Roman learning. Cardinal de Richelieu gave him a penſion of 2000 livres to inſpect all the works publiſhed at the Louvre, and deſigned to have made him principal of a college he was about to erect at Richelieu. But the cardinal's death cut off his hopes; and Cardinal Mazarine having no great reliſh for learning, his penſion was ill-paid. Some time after, the Marquis de Franciere, governor of Langres, took him along with him to his government, and there he embraced the Proteſtant religion; after which he was invited to Saumur, where he was choſen Greek profeſſor. He there taught with extraordinary reputation. Young men were ſent to him from all the provinces in the kingdom, and even from foreign countries, while divines and profeſſors themſelves gloried in attending his lectures. He was preparing to go to Heidelberg, whither he was invited by the prince Palatine, when he died, aged 57. He wrote, 1. Notes on Anacreon, Lucretius, Longinus, Phædrus, Juſtin, Terence, Virgil, Horace, &c. 2. A ſhort account of the lives of the Greek poets. 3. Two volumes of letters; and many other works.

FEVRE (Claud le), an eminent French painter, was born at Fountainbleau in 1633, and ſtudied in the palace there, and then at Paris under Le Sueur and Le Brun; the latter of whom adviſed him to adhere to portraits, for which he had a particular talent, and in his ſtyle equalled the beſt maſters of that country. He died in England in 1675, aged 42.

FEZ, the capital of a kingdom of the ſame name in Barbary, in Africa. It is deſcribed as a very large place, ſurrounded with high walls, within which there are hills and valleys, only the middle being level and flat. The river, which runs through the city, is divided into two ſtreams, from which canals are cut into every part of the town; ſo that the moſques, colleges, palaces, and the houſes of great men, are amply ſupplied with water. They have generally ſquare marble baſons in the middle of the court of their houſes, which are ſupplied with water by marble pipes that paſs through the walls. They conſtantly run over, and the ſtream returns back into the ſtreet, and ſo into the river. The houſes are built with brick or ſtone; and are adorned on the outſide with fine Moſaic work, or tiles like thoſe of Holland. The wood-work and ceilings are carved, painted, and gilt. The roofs are flat; for they ſleep on the tops of the houſes in ſummer. Moſt of the houſes are two ſtories high, and ſome three. There are piazzes and galleries running all round the court on the inſide, ſo that you may go under cover from one apartment to another. The pillars are of brick, covered with glazed tiles, or of marble, with arches between. The timber-work is carved and painted with gay colours, and moſt of the rooms have marble ciſterns of water. Some of the great men build towers over their houſes ſeveral ſtories high, and ſpare no expence to render them beautiful; from hence they have a fine proſpect all over the city.

There are in this city 700 moſques, great and ſmall; 50 of which are magnificent, and ſupported with marble pillars, and other ornaments. The floors are covered with mats, as well as the walls to the height of a man. Every moſque has a tower or minaret, like thoſe in Turkey, with a gallery on the top, from whence they call the people to prayers. The principal moſque is near a mile and a half in circumference. The middle building is 150 yards in length, and 80 in breadth, with a tower proportionably high. Round this to the eaſt, weſt, and north, there are great colonades 30 or 40 yards long. There are 900 lamps lighted every night; and in the middle of the moſque are large branches which are capable of holding 500 lamps each. Along the walls are ſeven pulpits, from which the doctors of the law teach the people. The buſineſs of the prieſt is only to read prayers, and diſtribute alms to the people; to ſupport which, there are large revenues.

Beſides the moſques, there are two colleges built in the Mooriſh manner, and adorned with marble and paintings. In one of them there are 100 rooms, beſides a magnificent hall. In this there is a great marble vaſe full of water, adorned with marble pillars of various colours, and finely poliſhed. The capitals are gilt, and the roof ſhines with gold, azure, and purple. The walls are adorned with Arabic verſes in gold characters. The other colleges are not near ſo beautiful, or rather all are gone to ruin ſince the neglect of learning.

There are hoſpitals in the city, where formerly all ſtrangers were maintained three days *gratis*. But the eſtates belonging to them have been confiſcated for the emperor's uſe. There are above 100 public baths, many of which are ſtately buildings. People of the ſame trade or buſineſs live in ſtreets by themſelves.

Though the country about Fez is pleaſant and fertile, and in many places abounding with corn and cattle, yet a great part of it lies waſte and uncultivated, not ſo much for want of inhabitants as from the oppreſſion of the governors; which makes the people chooſe to live at ſome diſtance from the high roads, where they cultivate juſt as much land as is neceſſary for their own ſubſiſtence.

Round the city there are fine marble tombs, monuments, and gardens full of all manner of fruit-trees.

Such are the common accounts of this city. The following are given by M. Chenier in his *Recherches Hiſtoriques ſur les Maures.*

Fez was built in the end of the eighth century by Edris, a deſcendant of Mahomet and of Ali; whoſe father, in order to avoid the preſcriptions of the calif Abdallah, retired to the extremity of Africa, and was proclaimed ſovereign by the Moors. Sidy Edris, having ſucceeded to the throne of his father, built the city of Fez in the year 793. He cauſed a moſque to be erected, in which his body was interred, and the city ever afterwards became an aſylum for the Moors, and a place of devotion. In the firſt moments of fer-vour which a new worſhip inſpires, another moſque was built called *Caruhin*, which is perhaps one of the largeſt and moſt beautiful edifices in Africa. Several others were ſucceſſively built, beſides colleges and hoſpitals; and the city was held in ſuch veneration, that when the pilgrimage to Mecca was interrupted in the fourth century of the Hegira, the weſtern Mahometans ſubſtituted that of Fez in its ſtead, while the eaſtern people went to Jeruſalem.

When the Arabs had overſpread Aſia, Africa, and Europe, they brought to Fez the little knowledge they had acquired in the ſciences and arts; and that capital conjoined, with the ſchools of religion, academies where philoſophy was taught, together with medicine and aſtronomy. This laſt gradually degenerated; ignorance brought aſtrology into repute, and this quickly engendered the arts of magic and divination.

Fez ſoon became the common reſort of all Africa. The Mahometans went thither for the purpoſes of devotion; the affluence of ſtrangers introduced a taſte for pleaſure; libertiniſm quickly followed; and, as its progreſs is moſt rapid in warm countries, Fez, which had been the nurſe of ſciences and arts, became a harbour for every kind of vice. The public baths, which health, cleanlineſs, and cuſtom, had rendered neceſſary, and which were every where reſpected as ſacred places, became ſcenes of debauchery; where men introduced themſelves in the habit of women: youths, in the ſame diſguiſe, with a diſtaff in their hands, walked the ſtreets at ſunſet in order to entice ſtrangers to their inns, which were leſs a place of repoſe than a convenience for proſtitution.

The uſurpers who diſputed the kingdom of Fez after the 16th century overlooked theſe abuſes, and contented themſelves with ſubjecting the maſters of the inns to furniſh a certain number of cooks for the army. It is to this laxity of diſcipline that Fez owed its firſt ſplendour. As the inhabitants are beautiful, the Africans flocked thither in crowds; the laws were overturned, morals deſpiſed, and vice itſelf turned into an engine of political reſource. The ſame ſpirit, the ſame inclinations, the ſame depravity, ſtill exiſt in the hearts of all the Moors. But libertiniſm is not now encouraged: it wears there, as in other places, the maſk of hypocriſy; and dares not venture to ſhow itſelf in the face of day.

The Mahometans of Andaluſia, thoſe of Granada and Cordoua, migrated to Fez during the different revolutions that agitated Spain: they carried with them new cuſtoms and new arts, and perhaps ſome ſlight degree of civilization. The Spaniſh Moors carried from Cordoua to Fez the art of ſtaining goat and ſheep ſkins with a red colour, which were then called Cordoua leather, and now Morocco leather, from that city where the art is leſs perfect. They manufacture gauzes at Fez, ſilk ſtuffs, and girdles elegantly embroidered with gold and ſilk, which ſhow how far their ingenuity might be carried if induſtry were more encouraged.

There is ſtill ſome taſte for ſtudy preſerved at Fez, and the Arabic language is ſpoken there in greater purity than in any other part of the empire. The rich Moors ſend their children to the ſchools at Fez, where they are better inſtructed than they could be elſewhere.

Leo Africanus, in the 16th century, gave a magnificent deſcription of this city, from which moſt of thoſe that have been afterwards made are copied; but its ſituation, its ſchools, and the induſtry and great urbanity of its inhabitants, are the only circumſtances that give it any preference to the other cities of the empire. There are ſome pretty convenient inns here, conſiſting of two or three ſtories. The houſes have no elegance externally: the ſtreets are ill paved, and ſo ſtrait that two perſons riding abreaſt can hardly paſs. The ſhops are like ſtalls; and have no more room in them than is ſufficient to ſerve for the owner, who is always ſeated with his wares around him, which he ſhows to the paſſengers. But though the Moors of Fez are more civilized than the reſt, they are vain, ſuperſtitious, and intolerant; and an order muſt be obtained from the emperor before a Chriſtian or a Jew can be allowed to enter the city.

The ſituation of Fez is exceedingly ſingular. It lies in the bottom of a valley ſurrounded by little hills in the ſhape of a funnel; the declivities are divided into gardens planted with tall trees, orange ſhrubs, and all ſorts of fruit-trees; a river meanders along the declivity, and turns a number of mills, which diſperſe the water abundantly to all the gardens, and almoſt to every houſe. The deſcent to the city, which ſtands in the centre, is long; and the road lies through theſe gardens, which it traverſes in a ſerpentine direction.

The gardens ſeen from the city, form a moſt delightful amphitheatre. Formerly each garden had a houſe in which the inhabitants ſpent the ſummer. Theſe houſes were deſtroyed in the times of the civil wars, and in the revolutions to which Fez has been ſubject, and few individuals have reſtored them. The ſituation of Fez, however, cannot be healthful; moiſt vapours fill the air in ſummer, and fevers are exceedingly common.

On the height above Fez, in a plain ſuſceptible of rich cultivation, ſtands New Fez, finely ſituated, and enjoying excellent air, containing ſome old palaces, in which the children of the emperor live, and where he ſometimes reſides himſelf. New Fez is inhabited by ſome Mooriſh families, but by a greater number of Jews.

Fez is ſeated on the river Cebu, W. Long. 4. 25. N. Lat. 33. 58.

FEWEL. See FUEL.

FIASCONE, a town of Italy in the territories of the pope, remarkable for its good wine. E. Long. 13. 12. N. Lat. 42. 20.

FIAT, in law, a ſhort order or warrant ſigned by a judge, for making out and allowing certain proceſſes.

FIBRARIÆ, a claſs of foſſils, naturally and eſſentially ſimple, not inflammable nor ſoluble in water; and compoſed of parallel fibres, ſome ſhorter, others longer; their external appearance being bright, and in ſome degree tranſparent: add to this, that they never give fire with ſteel, nor ferment with or are ſoluble in acid menſtrua.

FIBRE, in anatomy, a perfectly ſimple body, or at leaſt as ſimple as any thing in the human ſtructure; being fine and ſlender like a thread, and ſerving to form other parts. Hence ſome fibres are hard, as the bony ones; and others ſoft, as thoſe deſtined for the formation of all the other parts.

Theſe fibres are divided alſo, according to their ſituation into ſuch as are ſtraight, oblique, tranſverſe, annular, and ſpiral; being found arranged in all theſe directions in different parts of the body.

Fibre is alſo uſed to denote the ſlender Filaments which compoſe other bodies, whether animal, vegetable, or mineral; but more eſpecially the capillary roots of plants.

FIBROSE, or Fibrous, ſomething conſiſting of fibres, as the roots of plants. See Root.

FIBULA, in anatomy, the outer and ſlenderer of the two bones of the leg. See Anatomt, nº 62.

Fibula, in ſurgery, an inſtrument in uſe among the ancients for the cloſing of gaping wounds.—Celſus ſpeaks of the fibula as to be uſed when the wound was ſo patent as not eaſily to admit of being ſewed. *(Op.* lib. viii. cap. 25. *apud. fin.)*

Fibula, in antiquity, was a ſort of button, buckle, or claſp, made uſe of by the Greeks and Romans for keeping cloſe or tying up ſome part of their cloaths. They are of various forms, and often adorned with precious ſtones. Men and women wore them in their hair and at their ſhoes. Players and muſicians, by way of preſerving the voices of children put under their care to learn their arts, uſed to keep cloſe the prepuce with a fibula, leaſt they ſhould have commerce with women.

FICINUS (Marſilius), a celebrated Italian, was born at Florence in 1433, and educated at the expence of Laurence de Medicis. He attained a perfect knowledge of the Greek and Latin tongues, and became a great philoſopher, a great phyſician, and a great divine. He was in the higheſt favour with Laurence and Coſmo de Medicis, who made him a canon of the cathedral church of Florence. He applied himſelf intenſely to the ſtudy of philoſophy: and while others were ſtriving who ſhould be the deepeſt read in Ariſtotle, who was then the philoſopher in faſhion, he devoted himſelf wholly to Plato. He was indeed the firſt who reſtored the Platonic philoſophy in the weſt; for the better effecting of which, he tranſlated into Latin the whole works of Plato. There goes a ſtory, but we know not how true it is, that when he had finiſhed his tranſlation, he communicated it to his friend Marcus Muſurus, to have his approbation of it; but that, Muſurus diſliking it, he did it all over again. He next tranſlated Plotinus; and afterwards the works, or part of them at leaſt, of Proclus, Jamblicus, Porphyrius, and other celebrated Platoniſts.—In his younger years, Ficinus lived like a philoſopher; and too much ſo, as is ſaid, to the neglect of piety. However, Savanorola coming to Florence, Ficinus went with every body elſe to hear his ſermons; and while he attended them for the ſake of the preacher's eloquence, he imbibed a ſtrong ſenſe of religion, and devoted himſelf henceforward more eſpecially to the duties of it. He died at Correggio in 1499; and as Baronius aſſures us upon the teſtimony of what he calls credible authors, appeared immediately after his death to his friend Michael Mercatus: to whom, it ſeems, he had promiſed to appear, in order to confirm what he had taught concerning the immortality of the ſoul. His writings, ſacred and profane, which are very numerous, were collected and printed at Venice in 1516, at Baſil in 1561 and 1576, and at Paris 1641, in two vols folio. Twelve books of his Epiſtles, among which are many treatiſes, were printed ſeparately in folio at Venice 1495, and at Nuremberg 1497, in 4to.

FICOIDES, a name given to ſeveral diſtinct plants, as the meſembryanthemum, muſa, and opuntia. See Mesembryanthemum, &c.

FICTION. See Fable and Poetry.

FICUS, the fig-tree: A genus of the triœcia order, belonging to the polygamia claſs of plants; and in the natural method ranking under the 53d order, *Scabridæ.* The receptacle is common, turbinated, carnous, and connivent; incloſing the florets either in the ſame or in a diſtinct one. The male calyx is tripartite; no corolla; three ſtamina: The female calyx is quinquepartite; no corolla; one piſtil; and one ſeed.—There are ten ſpecies, of which the following are the moſt remarkable.

1. The Carica, or common Fig, with an upright ſtem branching 15 or 20 feet high, and garniſhed with large palmated or hand-ſhaped leaves. Of this there are a number of varieties; as the common fig, a large, oblong, dark purpliſh blue fruit, which ripens in Auguſt either on ſtandards or walls, and the tree carries a great quantity of fruit.—The brown or cheſtnut fig; a large, globular, cheſtnut-coloured fruit, having a purpliſh delicious pulp, ripening in July and Auguſt.—The black Iſchia fig; a middle-ſized, ſhortiſh, flat-crowned, blackiſh fruit, having a bright pulp; ripening in the middle of Auguſt.—The green Iſchia fig: a large, oblong, globular headed, greeniſh fruit, ſlightly ſtained by the pulp to a reddiſh-brown colour; ripens in the end of Auguſt.—The brown Iſchia fig; a ſmall, pyramidal, browniſh-yellow fruit, having a purpliſh very rich pulp; ripening in Auguſt and Semptember.—The Malta fig; a ſmall flat-topped brown fruit, ripening in the middle of Auguſt or beginning of September.—The round brown Naples fig; a globular, middle-ſized, light-brown fruit, and browniſh pulp; ripe in the end of Auguſt.—The long, brown, Naples fig; a long dark-brown fruit, having a reddiſh pulp; ripe in September.—The great blue fig; a large blue fruit, having a fine red pulp.—The black Genoa fig; a large, pear-ſhaped, black-coloured fruit, with a bright red pulp; ripe in Auguſt.

2. The Sycamorus, or Sycamore of ſcripture. According to Mr Haſſelquiſt, this is a huge tree, the ſtem being often 50 feet round. The fruit is pierced in a remarkable manner by an inſect. There is an opening made in the calyx near the time the fruit ripens, which is occaſioned in two different ways. 1. When the ſquamæ, which cover the calyx, wither and are bent back; which, however, is more common to the carica than the ſycamore. 2. A little below the ſcales, on the ſide of the flower-cup, there appears a ſpot before the fruit is ripe; the fruit in this place is affected with a gangrene which extends on every ſide, and frequently occupies a fingers's-breadth. It withers; the place affected becomes black: the fleſhy ſubſtance in the middle of the calyx, for the breadth of a quill, is corroded; and the male bloſſoms, which are neareſt to the bare ſide, appear naked, opening a way for the inſect, which makes ſeveral furrows in the inſide of the fruit, but never touches the ſtigmata, though it frequently eats the germen. The wounded or gangrenous part is at firſt covered or ſhut up by the bloſſoms; but the hole is by degrees opened and enlarged of various ſizes in the different fruits; the margin and ſides being always gangrenous, black, hard, and turned inwardly. The ſame gangrenous appearance is alſo

found near the ſquamæ, after the inſect has made a hole in that place. The tree is very common in the plains and fields of Lower Egypt. It buds in the latter end of March, and the fruit ripens in the beginning of June. It is wounded or cut by the inhabitants at the time it buds; for without this precaution, they ſay it would not bear fruit.

3. The Religioſa, or Banian-tree, is a native of ſeveral parts of the Eaſt-Indies. It hath a woody ſtem, branching to a great height and vaſt extent, with heart-ſhaped entire leaves ending in acute points. Of this tree the following lines of Milton contain a deſcription equally beautiful and juſt:

> ——There ſoon they choſe
> The fig-tree; not that tree for fruit renown'd,
> But ſuch as, at this day to Indians known
> In Malabar or Decan, ſpreads her arms,
> Branching ſo broad and long, that in the ground
> The bended twigs take root, and daughters grow
> About the mother tree, a pillar'd ſhade,
> High over arch'd, and echoing walks between:
> There oft the Indian herdſman, ſhunning heat,
> Shelters in cool, and tends his paſturing herds
> At loop-holes cut through thickeſt ſhade.
> Par. Lost, Book ix. l. 1100.

The Banian-tree, or Indian fig, is perhaps the moſt beautiful of Nature's productions in that genial climate, where ſhe ſports with the greateſt profuſion and variety. Some of theſe trees are of amazing ſize and great extent, as they are continually increaſing, and, contrary to moſt other things in animal and vegetable life, they ſeem to be exempted from decay. Every branch from the main body throws out its own roots; at firſt in ſmall tender fibres, ſeveral yards from the ground: theſe continually grow thicker until they reach the ſurface; and there ſtriking in, they increaſe to large trunks, and become parent-trees, ſhooting out new branches from the top: theſe in time ſuſpend their roots, which, ſwelling into trunks produce other branches; thus continuing in a ſtate of progreſſion as long as the earth, the firſt parent of them all contributes her ſuſtenance. The Hindoos are peculiarly fond of the Banian-tree; they look upon it as an emblem of the Deity, from its long duration, its out-ſtretching arms, and overſhadowing beneficence; they almoſt pay it divine honours, and,

> "Find a fane in every ſacred grove."

Near theſe trees the moſt eſteemed pagodas are generally erected; under their ſhade the Bramins ſpend their lives in religious ſolitude; and the natives of all caſts and tribes are fond of recreating in the cool receſſes, beautiful walks, and lovely viſtas of this umbrageous canopy, impervious to the hotteſt beams of a tropical ſun.

A remarkable large tree of this kind grows on an iſland in the river Nerbedda, ten miles from the city of Baroche in the province of Guzerat, a flouriſhing ſettlement, lately in the poſſeſſion of the Engliſh Eaſt India company, but ceded by the government of Bengal, at the treaty of peace concluded with the Mahrattas in 1783, to Mahdajee Scindia a Mahratta chief. It is diſtinguiſhed by the name of Cubber Burr, which was given it in honour of a famous ſaint. It was once much larger than at preſent: but high floods have carried away the banks of the iſland where it grows, and with them ſuch parts of the tree as had thus far extended their roots: yet what remains is about 2000 feet in circumference, meaſured round the principal ſtems; the over hanging branches, not yet ſtruck down, cover a much larger ſpace. The chief trunks of this ſingle tree (which in ſize greatly exceed the Engliſh elms and oaks), amount to 350; the ſmaller ſtems, forming into ſtronger ſupporters, are more than 3000; and every one of theſe is caſting out new branches, and hanging roots in time to form trunks, and become the parents of a future progeny. Cubbeer Burr is famed throughout Indoſtan for its great extent and ſurpaſſing beauty: the Indian armies generally encamp around it; and at ſtated ſeaſons, ſolemn jatarras, or Hindoo feſtivals, are held there, to which thouſands of votaries repair from various parts of the Mogul empire. It is ſaid that 7000 perſons find ample room to repoſe under its ſhade. The Engliſh gentlemen, on their hunting and ſhooting parties, uſed to form extenſive encampments, and ſpend weeks together under this delightful pavilion, which is generally filled with green wood-pigeons, doves, peacocks, and a variety of feathered ſongſters; crowded with families of monkies performing their antic tricks; and ſhaded by bats of a large ſize, many of them meaſuring upwards of ſix feet from the extremity of one wing to the other. This tree not only affords ſhelter, but ſuſtenance, to all its inhabitants, being covered amid its bright foliage with ſmall figs of a rich ſcarlet, on which they all regale with as much delight, as the lords of creation on their more coſtly fare in their parties.

Culture. The carica is the ſpecies of ficus moſt frequently cultivated in Britain, and the only one which does not require to be in a ſtove. It may be propagated either by ſuckers ariſing from the roots by layers, or by cuttings. The ſuckers are to be taken off as low down as poſſible; trim off any ragged part at bottom, leaving the tops entire, eſpecially if for ſtandards; and plant them in nurſery-lines at two or three feet diſtance from each other, or they may at once be planted where they are to remain; obſerving, that if they are deſigned for walls, or eſpaliers, they may be headed to ſix or eight inches in March, the more effectually to force out lateral ſhoots near the bottom; but, if intended for ſtandards, they muſt not be topped, but trained with a ſtem, not leſs than 15 or 18 inches for dwarf-ſtandards, a yard for half-ſtandards, and four, five, or ſix feet for full ſtandards. Then they muſt be ſuffered to branch out to form a head; obſerving, that, whether againſt walls, eſpaliers, or ſtandards, the branches or ſhoots muſt never be ſhortened unleſs to procure a neceſſary ſupply of wood: for the fruit is always produced on the upper parts of the young ſhoots; and if theſe are cut off, no fruit can be expected.—The beſt ſeaſon for propagating theſe trees by layers is in autumn; but it may be alſo done any time from October to March or April. Chooſe the young pliable lower ſhoots from the fruitful branches: lay them in the uſual way, covering the body of the layers three or four inches deep in the ground, keeping the top entire and as upright as poſſible; and they will be rooted and fit to ſeparate from the parent in autumn; when they may be planted either in the nurſery, or where they are to remain, managing them as above directed.

The time for propagating by cuttings is either in autumn at the fall of the leaf, or any time in March: chooſe well-ripened ſhoots of the preceding ſummer; ſhort and of robuſt growth, from about 12 to 15 inches long; having an inch or two of the two years wood at their baſe, the tops left entire; and plant

Ficus, Fidd.

them ſix or eight inches deep, in a bed or border of good earth, in rows two feet aſunder: and when planted in autumn, it will be eligible to protect their tops in time of hard froſt, the firſt winter, with any kind of long looſe litter.

That part of the hiſtory of the fig-tree, which for many ages was ſo enigmatical, namely, the *caprification*, as it is called, is particularly worthy of attention, not only as a ſingular phenomenon in itſelf, but as it has furniſhed one of the moſt convincing proofs of the reality of the ſexes of plants. In brief it is this: The flowers of the fig-tree are ſituated within a pulpy receptacle, which we call fig or fruit: of theſe receptacles in the wild fig-tree, ſome have male flowers only, and others have male and female, both diſtinct, though placed in the ſame receptacle. In the cultivated fig, theſe are found to contain only female flowers; which are fecundated by means of a kind of gnatbred in the fruit of the wild fig-trees, which pierces that of the cultivated, in order to depoſit its eggs within; at the ſame time diffuſing within the receptacle the farina of the male flowers. Without this operation the fruit may ripen, but no effective ſeeds are produced: hence the garden fig can only be propagated by layers and cuttings in thoſe countries where the wild fig is not known. The proceſs of thus ripening the fruit, in the oriental countries, is not left to nature, but it is managed with great art, and different degrees of dexterity, ſo as to reward the ſkilful huſbandman with a much larger increaſe of fruit than would otherwiſe be produced. A tree of the ſame ſize, which, in Provence, where caprification is not practiſed, may produce about 25 pounds of fruit, will, by that art in the Grecian iſlands bring ten times that quantity. See the article CAPRIFICATION.

Uſes. Figs are a conſiderable article in the materia medica, chiefly employed in emollient cataplaſms and pectoral decoctions. The beſt are thoſe which come from Turkey. Many are alſo brought from the ſouth of France, where they prepare them in the following manner. The fruit is firſt dipped in ſcalding hot lye made of the aſhes of the fig-tree, and then dried in the ſun. Hence theſe figs ſtick to the hands, and ſcour them like lixivial ſalts; and for the ſame reaſon they excite to ſtool, without griping. They are moderately nutrimental, grateful to the ſtomach, and eaſier to digeſt than any other of the ſweet fruits. They have been ſaid to produce lice when eaten as a common food; but this ſeems to be entirely without foundation. The reaſon of this ſuppoſition ſeems to be, that in the countries where they grow naturally, they make the principal food of the poor people, who are generally troubled with theſe vermin. The wood of the ſycamore is not ſubject to rot: and has therefore been uſed for making of coffins, in which embalmed bodies were put. Mr Haſſelquiſt affirms, that he ſaw in Egypt coffins made of this kind of wood, which had been preſerved ſound for 2000 years.

FIDD, an iron pin uſed at ſea to ſplice or faſten ropes together; it is made tapering and ſharp at one end.

There are alſo fidds of wood, which are much larger than the iron ones.

The pin alſo in the heel of the topmaſt, which bears it upon the cheſs-tree, is called a *fidd*.

Fiddle || Field.

FIDD-Hammer, is uſed for a hammer, the handle of which is a fidd, or made tapering into that form.

FIDDLE. See VIOLIN.

FIDDLE-Wood. See CITHAREXELON.

FIDDES (Richard), a learned divine and polite writer, was born in 1671, and educated at Oxford. He was preſented to the living of Halſham in Yorkſhire, where he was ſo admired for the ſweetneſs of his voice, and the gracefulneſs of his delivery, that the people for ſeveral miles round flocked to his ſermons. Coming to London in 1712, he was, by the favour of Dean Swift, introduced to the earl of Oxford, who made him one of his chaplains, and the queen ſoon after appointed him chaplain to the garriſon at Hull: but loſing his patrons upon the change of the miniſtry, he loſt his chaplainſhip; and being obliged to apply himſelf to writing, compoſed, 1. A Body of Divinity; 2. The Life of Cardinal Wolſey; 3. A Treatiſe of Morality, &c. He died in 1725.

FIDE-JUSSORES *Aſſidui.* See ASSIDUUS.

FIDE-Juſſor, in the civil law, is a ſurety, or one that obliges himſelf in the ſame contract with a principal, for the greater ſecurity of the creditor or ſtipulator.

FIDEI-COMMISSUM, in Roman antiquity, an eſtate left in truſt with any perſon for the uſe another. See TRUSTEE.

FIDENA, or FIDENÆ, (anc. geog.) a town of the Sabines, five miles to the north of Rome, where traces of it are ſtill to be ſeen. Fidenates the people (Livy.)

FIDES, FAITH or FIDELITY, one of the virtues deified by the Pagans. She had a temple near the Capitol, founded by Numa Pompilius; but no animals were offered, or blood ſpilt, in her ſacrifices. During the performance of her rites, her prieſts appeared in white veſtments, with their heads and hands covered with linen, to ſhow that fidelity ought to be ſacred.

FIDIUS, in Pagan worſhip, a god who preſided over alliances and promiſes. This deity, which the Romans borrowed from the Sabines, was alſo called *Sanctus*, *Semon*, and *Semi-pater*.

FIELD, in agriculture, a piece of ground incloſed, whether for tillage or paſture.

FIELD, in heraldry, is the whole ſurface of the ſhield or the continent, ſo called becauſe it containeth thoſe atchievements anciently acquired in the field of battle. It is the ground on which the colours, bearing, metals, furs, charges, &c. are repreſented. Among the modern heralds, field is leſs frequently uſed in blazoning than ſhield or eſcutcheon. See the article SHIELD, &c.

FIELD-Book, in ſurveying, that wherein the angles, ſtations, diſtances, &c. are ſet down.

FIELD-Colours, in war, are ſmall flags of about a foot and a half ſquare, which are carried along with the quarter-maſter general, for marking out the ground for the ſquadrons and battalions.

FIELD-Fare, in ornithology. See TURDUS.

FIELD-Officers, in the art of war. See OFFICER.

FIELD-Pieces, ſmall cannons, from three to twelve pounders, carried along with the army in the field.

FIELD-Staff, a weapon carried by the gunners, about the length of a halbert, with a ſpear at the end; having on each ſide ears ſcrewed on, like the cock of a match-lock, where the gunners ſcrew in lighted matches when they are upon command; and then the field-ſtaffs are ſaid to be armed.

Field-Works, in fortification, are thoſe thrown up by an army in beſieging a fortreſs, or by the beſieged to defend the place. Such are the fortifications of camps, highways, &c.

Elyſian Fields. See ELYSIAN.

FIELDING (Henry), a well known writer of the preſent age, ſon of lieutenant-general Fielding who ſerved under the duke of Marlborough, was born in 1707. He had four ſiſters; of whom Sarah is well known, as writer of The Adventures of David Simple. On the death of his mother, his father married again; and Sir John Fielding who ſucceeded him in the commiſſion of the peace for Middleſex, was his brother by this marriage. Henry was ſent to ſtudy at Leyden; but a failure in his remittances obliged him to return in two years, when his own propenſity to gaiety and profuſion drove him to write for the ſtage at 20 years of age. His firſt dramatic piece, Love in ſeveral Maſques, which was well received, appeared in 1727: and all his plays and farces, to the amount of 18, were written before the year 1737: and many of them are ſtill acted with applauſe. While he was thus employed, he married a youg lady with 1500 l. fortune, and inherited an eſtate of 200 l. a-year from his mother: all which, though upon the plan of retiring into the country, he contrived to diſſipate in three years; and then applied himſelf to the ſtudy of the law for a maintenance. In loſing his fortune, he acquired the gout; which rendering it impoſſible for him to attend the bar, he with a ſhattered conſtitution had recourſe to many extempore applications of his pen for immediate ſupplies; until, ſoon after the late rebellion, he accepted the office of acting juſtice for Middleſex, an employment much more profitable than honourable in the public eſteem. Reduced at length by the fatigues of this office, and by a complication of diſorders, he by the advice of his phyſicians went to Liſbon, where he died in 1754. He wrote a great number of fugitive pamphlets and periodical eſſays; but is chiefly diſtinguiſhed by his Adventures of Joſeph Andrews, and Hiſtory of Tom Jones. His works have been collected and publiſhed, with his life prefixed, by Mr Murphy.

FIENUS (Thomas), an ingenious and learned phyſician, born at Antwerp in 1566. He went into Italy to ſtudy phyſic under Mercurialis and Aldrovandus; and on his return diſtinguiſhed himſelf ſo much in the univerſity of Louvain, that he was there choſen profeſſor of phyſic, and was afterwards made phyſician to the duke of Bavaria. He wrote ſeveral works, among which were, *De viribus imaginationis*; and *De formatione fœtus*. He died at Louvain in 1631.

FIERI FACIAS, in law, a writ that lies where a perſon has recovered judgment for a debt or damages in the courts againſt one, by which the ſheriff is commanded to levy the debt and damages on the defendant's goods and chattels.

FIFE, in muſic, is a ſort of wind-inſtrument, being a ſmall pipe. See PIPE.

FIFE, a county of Scotland, bounded on the weſt by Clackmannan and Perthſhire, on the north by Perthſhire only, on the north-eaſt by the river Tay, on the eaſt by the German ocean, and on the ſouth by the Frith of Forth. It is about 32 miles long, and 17 broad; though along the coaſt, from Crail to Culroſs, it extends about 40 miles in length. The face of the country is various. Towards the weſt it is mountainous, having the Lomond hills riſing to a great height; to the eaſt it is flat, well-cultivated, and produces grain of all kinds in great plenty. It is full of towns; and has many good bays and harbours, which breed great numbers of hardy ſeamen. Formerly theſe towns carried on very extenſive trade, but now are gone into decay; though, being all royal boroughs, they ſend ſeveral members to parliament. The hills are covered with ſheep and black cattle; coal, with which the county abounds, is ſhipped off in great quantities; and the linen-manufacture is carried on to a conſiderable extent. The principal rivers are the Leven and the Eden, which produce trout and other fiſh of various kinds.—Fife is the moſt populous county in Scotland, having one full ſynod and four preſbyter-ſeats within itſelf. It ſends one member to parliament; and gives an Iriſh title of *earl* to the Duffs of Braco, the deſcendants of the ancient Thanes of Fife. Cupar is the county-town.

Fife-Rails, in a ſhip, are thoſe that are placed on baniſters, on each ſide of the top of the poop, and ſo along with haunces or falls. They reach down to the quarter-deck, and to the ſtair of the gang-way.

FIFTH, in muſic. See INTERVAL.

FIG, or FIG-TREE. See FICUS.

FIGWORT, a plant called by the botaniſts SCROPHULARIA.

FIGURAL, FIGURATE, or *Figurative*, a term applied to whatever is expreſſed by obſcure reſemblances. The word is chiefly applied to the types and myſteries of the Moſaic law; as alſo to any expreſſion which is not taken in its primary and literal ſenſe.

FIGURE, in phyſics, expreſſes the ſurface or terminating extremities of any body.

FIGURES, in arithmetic, are certain characters whereby we denote any number which may be expreſſed by any combination of the nine digits, &c. See ARITHMETIC.

FIGURE, among divines, is uſed for the myſteries repreſented under certain types.

FIGURE, in dancing, denotes the ſeveral ſteps which the dancer makes in order and cadence, conſidered as they mark certain figures on the floor. See DANCING.

FIGURE, in painting and deſigning, denotes the lines and colours which form the repreſentation of any animal, but more particularly of a human perſonage. See the article PAINTING.

FIGURE, in the manufactures, is applied to the various deſigns repreſented or wrought on velvets, damaſks, taffaties, ſattins, and other ſtuffs and cloths.

The moſt uſeful figures for ſuch deſigns are flowers, imitated from the life; or groteſques, and compartiments of pure fancy. Repreſentations of men, beaſts, birds, and landſcapes, have only been introduced ſince the taſte for the Chineſe ſtuffs, particularly thoſe called *furees*, began to prevail among us. It is the woof of the ſtuff that forms the figures; the warp only ſerves for the ground. In working figured ſtuffs, there is required a perſon to ſhow the workman how far he muſt raiſe the threads of the warp, to repreſent the figure of the deſign with the woof, which is to be paſſed acroſs between the threads thus raiſed. This ſome call *reading of the deſign*.

For the figures on tapeſtry, brocade, &c. See TAPESTRY, &c.

For thoſe given by the calenders, printers, &c. ſee CALENDER, &c.

FIGURE, in logic, denotes a certain order and diſpoſition of the middle term in any ſyllogiſm.

Figures are fourfold. 1. When the middle term is the ſubject of the major propoſition, and the predicate of the minor, we have what is called the firſt figure. 2. When the middle term is the predicate of both the premiſes, the ſyllogiſm is ſaid to be in the ſecond figure. 3. If the middle term is the ſubject of the two premiſſes, the ſyllogiſm is in the the third figure: and, laſtly, by making it the predicate of the major, and ſubject of the minor, we obtain ſyllogiſms in the fourth figure. Each of theſe figures has a determinate number of moods, including all the poſſible ways in which propoſitions differing in quantity or quality can be combined, according to any diſpoſition of the middle term, in order to arrive at a juſt concluſion. See LOGIC.

FIGURE, in compoſition. See ORATORY; alſo ALLEGORY, APOSTROPHE, HYPERBOLE, METAPHOR, PERSONIFICATION, &c.

Elem. of Criticiſm.

A FIGURE, *the means or inſtrument conceived to be the agent.* When we ſurvey a number of connected objects, that which makes the greateſt figure employs chiefly our attention; and the emotion it raiſes, if lively, prompts us even to exceed nature in the conceptions we form of it. Take the following examples.

> For Neleus' ſon Alcides' *rage* had ſlain.
> A broken rock the *force* of Pirus threw.

In theſe inſtances, the rage of Hercules and the force of Pirus, being the capital circumſtances, are ſo far exalted as to be conceived the agents that produce the effects.

In the firſt of the following inſtances, hunger being the chief circumſtance in the deſcription, is itſelf imagined to be the patient.

> Whoſe hunger has not taſted food theſe three days.
> *Jane Shore.*
> ——————As when the *force*
> Of ſubterranean wind tranſports a hill. *Paradiſe Loſt.*
> ——————As when the *potent rod*
> Of Amram's ſon, in Egypt's evil day
> Wav'd round the coaſt, upcall'd a pitchy cloud
> Of locuſts, *Paradiſe Loſt.*

A FIGURE, *which, among related objects, extends the properties of one to another.* This figure is not dignified with a proper name, becauſe it has been overlooked by writers. *Giddy brink, jovial wine, daring wound,* are examples of this figure. Here are adjectives that cannot be made to ſignify any quality of the ſubſtantives to which they are joined: a *brink*, for example, cannot be termed *giddy* in a ſenſe, either proper or figurative, that can ſignify any of its qualities or attributes. When we examine attentively the expreſſion, we diſcover, that a *brink* is termed *giddy* from producing that effect in thoſe who ſtand on it: in the ſame manner, a wound is ſaid to be *daring*, not with reſpect to itſelf, but with reſpect to the boldneſs of the perſon who inflicts it: and wine is ſaid to be *jovial*, as inſpiring mirth and jollity. Thus the attributes of one ſubject are extended to another with which it is connected; and the expreſſion of ſuch a thought muſt be conſidered as a figure, becauſe the attribute is not applicable to the ſubject in any proper ſenſe.

How we are to account for this figure, which we ſee lies in the thought, and to what principle ſhall we refer it? Have poets a privilege to alter the nature of things, and at pleaſure to beſtow attributes upon a ſubject to which they do not belong? It is obſerved †, that the mind paſſeth eaſily and ſweetly along a train of connected objects; and, where the objects are intimately connected, that it is diſpoſed to carry along the good or bad properties of one to another; eſpecially when it is in any degree inflamed with theſe properties. From this principle is derived the figure under conſideration. Language, invented for the communication of thought, would be imperfect, if it were not expreſſive even of the ſlighter propenſities and more delicate feelings: but language cannot remain ſo imperfect among a people who have received any poliſh; becauſe language is regulated by internal feeling, and is gradually improved to expreſs whatever paſſes in the mind. Thus, for example, when a ſword in the hand of a coward is termed *a coward ſword*, the expreſſion is ſignificative of an internal operation; for the mind, in paſſing from the agent to its inſtrument, is diſpoſed to extend to the latter the properties of the former. Governed by the ſame principle, we ſay *liſtening* fear by extending the attribute *liſtening* of the man who liſtens, to the paſſion with which he is moved. In the expreſſion *bold deed*, or *audax facinus*, we extend to the effect what properly belongs to the cauſe. But not to waſte time by making a commentary upon every expreſſion of this kind, the beſt way to give a complete view of the ſubject, is to exhibit a table of the different relations that may give occaſion to this figure. And in viewing the table, it will be obſerved, that the figure can never have any grace but where the relations are of the moſt intimate kind.

† Vide *Elem. of Criticiſm*, ch. ii. part 1, § 6.

1. An attribute of the cauſe expreſſed as an attribute of the effect.

> Audax facinus.
>
> Of yonder fleet a *bold* diſcovery make.
> An impious mortal gave the *daring* wound.
> ——————To my *advent'rous* ſong.
> That with no middle flight intends to ſoar. *Paradiſe Loſt.*

2. An attribute of the effect expreſſed as an attribute of the cauſe.

> Quos periiſſe ambos *miſero* cenſebam in mari, *Plautus.*
> No wonder, fallen ſuch a *pernicious* height.
> *Paradiſe Loſt.*

3. An effect expreſſed as an attribute of the cauſe.

Jovial wine, Giddy brink, Drowſy night, Muſing midnight, Panting height, Aſtoniſh'd thought, Mournful gloom.

> Caſting a dim *religious* light. MILTON, *Comus.*
> And the *merry* bells ring round,
> And the *jocund* rebecks ſound. MILTON, *Allegro.*

4. An attribute of a ſubject beſtowed upon one of its parts or members.

> *Longing* arms.
>
> It was the nightingale, and not the lark,
> That pierc'd the *fearful* hollow of thine ear.
> *Romeo and Juliet, act* 3, ſc. 7.
> ——Oh,

> ————————————Oh, lay by
> Thoſe moſt ungentle looks and angry weapons:
> Unleſs you mean my griefs and killing fears
> Should ſtretch me out at your *relentleſs* feet.
> *Fair Penitent, act* 3.
>
> ————————And ready now
> To ſtoop with *wearied* wing, and *willing* feet,
> On the bare outſide of this world. *Paradiſe Loſt, b.* 3.

5. A quality of the agent given to the inſtrument with which it operates.

> Why peep your *coward* ſwords half out their ſhells?

6. An attribute of the agent given to the ſubject upon which it operates.

> *High-climing* hill. *Milton.*

7. A quality of one ſubject given to another.

> Icci, *beatis* nunc Arabum invides
> Gazis. *Horat. Carm. l.* 1. *ode* 29.
>
> When ſapleſs age, and weak unable limbs,
> Should bring thy father to his *drooping* chair.
> *Shakeſpeare.*
>
> By art, the pilot through the boiling deep,
> And howling tempeſt, ſteers the *fearleſs* ſhip.
> *Iliad*, xxiii. 385.
>
> Then, nothing loth, th' enamour'd fair he led,
> And ſunk tranſported on the *conſcious* bed.
> *Odyſſey*, viii. 337.
>
> A *ſtupid* moment motionleſs ſhe ſtood.
> *Summer, l.* 1336.

8. A circumſtance connected with a ſubject, expreſſed as a quality of the ſubject.

> *Breezy* ſummit.
> 'Tis ours the chance of *fighting* fields to try.
> *Idiad*, i. 301.
>
> Oh? had I'dy'd before that *well-fought* wall.
> *Odyſſey*, v. 395.

From this table it appears, that the adorning a cauſe with an attribute of the effect, is not ſo agreeable as the oppoſite expreſſion. The progreſs from cauſe to effect is natural and eaſy: the oppoſite progreſs reſembles retrograde motion *; and therefore *panting height, aſtoniſh'd thought*, are ſtrained and uncouth expreſſions, which a writer of taſte will avoid.

It is not leſs ſtrained, to apply to a ſubject in its preſent ſtate, an epithet that may belong to it in ſome future ſtate:

> *Submerſaſque* obrue puppes. *Æneid*, i. 73.
>
> And mighty *ruins* fall. *Iliad*, v. 411.
> Impious ſons their *mangled* fathers wound.

Another rule regards this figure, That the property of one ſubject ought not to be beſtowed upon another with which that property is incongruous.

> *K. Rich.*————How dare thy joints forget
> To pay their *awful* duty to our preſence?
> *Richard* II. *act* 3. *ſc.* 6

The connection between an awful ſuperior and his ſubmiſſive dependent is ſo intimate, that an attribute may readily be transferred from the one to the other: but awfulneſs cannot be ſo transferred, becauſe it is inconſiſtent with ſubmiſſion.

FIGURE of Speech, as peculiarly diſtinguiſhed from the above and from thoſe firſt referred to.] Under the article *METAPHOR and Allegory*, a figure of ſpeech is defined, "The uſing a word in a ſenſe different from what is proper to it;" and the new or uncommon ſenſe of the word is termed *the figurative ſenſe*. The figurative ſenſe muſt have a relation to that which is proper, and the more intimate the relation is, the figure is the more happy. How ornamental this figure is to language, will not be readily imagined by any one who hath not given peculiar attention; and therefore we ſhall endeavour to unfold its capital beauties and advantages. In the firſt place, a word uſed figuratively, or in a new ſenſe, ſuggeſts at the ſame time the ſenſe it commonly bears: and thus it has the effect to preſent two objects; one ſignified by the figurative ſenſe, which may be termed *the principal object*; and one ſignified by the proper ſenſe, which may be termed *acceſſory*: the principal makes a part of the thought; the acceſſory is merely ornamental. In this reſpect, a figure of ſpeech is preciſely ſimilar to concordant ſounds in muſic, which, without contributing to the melody, make it harmonious.

Elem. of Criticiſm.

To explain the matter by examples. *Youth*, by a figure of ſpeech, is termed *the morning of life*: This expreſſion ſignifies *youth*, the principal object which enters into the thought; it ſuggeſts, at the ſame time, the proper ſenſe of *morning*; and this acceſſory object, being in itſelf beautiful, and connected by reſemblance to the principal object, is not a little ornamental. *Imperious ocean* is an example of a different kind, where an attribute is expreſſed figuratively: Together with *ſtormy*, the figurative meaning of the epithet *imperious*, there is ſuggeſted its proper meaning, viz. the ſtern authority of a deſpotic prince; and theſe two are ſtrongly connected by reſemblance. Upon this figurative power of words, Vida deſcants with elegance, *Poet. lib.* iii. 44.

In the next place, this figure poſſeſſes a ſignal power of aggrandiſing an object, by the following means. Words which have no original beauty but what ariſes from their ſound, acquire an adventitious beauty from their meaning: a word ſignifying any thing that is agreeable, becomes by that means agreeable; for the agreeableneſs of the object is communicated to its name. This acquired beauty, by the force of cuſtom, adheres to the word even when uſed figuratively; and the beauty received from the thing it properly ſignifies is, communicated to the thing which it is made to ſignify figuratively. Conſider the foregoing expreſſion *Imperious ocean*, how much more elevated it is than *Stormy ocean*.

Thirdly, This figure hath a happy effect by preventing the familiarity of proper names. The familiarity of a proper name is communicated to the thing it ſignifies by means of their intimate connection; and the thing is thereby brought down in our feeling. This bad effect is prevented by uſing a figurative word inſtead of one that is proper; as for example, when we expreſs the ſky by terming it *the blue vault of heaven*; for though no work of art can compare with the ſky in grandeur, the expreſſion, however, is reliſhed, becauſe it prevents the object from being brought down by the familiarity of its proper name. With reſpect to the degrading the familiarity of proper names, Vida has the following paſſage:

> Hinc ſi dura mihi paſſus dicendus Ulyſſes,
> Non illum vero memorabo nomine, ſed qui
> Et motes hominum multorum vidit, et urbes,
> Naufragus everſæ poſt ſæva incendia Trojæ.
> *Poet. lib.* ii. l. 46.

Laſtly, By this figure, language is enriched, and rendered more copious; in which reſpect, were there no other, a figure of ſpeech is a happy invention. This property is finely touched by Vida; *Poet. lib.* iii. 90.

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* See PERCEPTION *and Ideas in a Train.*

The beauties we have mentioned belong to every figure of ſpeech. Several other beauties peculiar to one or other ſort, we ſhall have occaſion to remark afterward.

Not only ſubjects, but qualities, actions, effects, may be expreſſed figuratively. Thus, as to ſubjects, *gates of breath* for the lips, *the watery kingdom* for the ocean. As to qualities, *fierce* for ſtormy, in the expreſſion *Fierce winter*; *altus* for profundus, *Altus puteus*, *Altum mare*; *breathing* for perſpiring, *Breathing plants*. Again, as to actions, The ſea *rages*, Time will *melt* her frozen thoughts, Time *kills* grief. An effect is put for the cauſe, as *lux* for the ſun; and a cauſe for the effect, as *boum labores* for corn. The relation of reſemblance is one plentiful ſource of figures of ſpeech; and nothing is more common than to apply to one object the name of another that reſembles it in any reſpect: Height, ſize, and worldly greatneſs, reſemble not each other; but the emotions they produce reſemble each other, and, prompted by this reſemblance, we naturally expreſs worldly greatneſs by height or ſize: One feels a certain uneaſineſs in ſeeing a great depth; and, hence depth is made to expreſs any thing diſagreeable by exceſs, as *depth* of grief, *depth* of deſpair: Again, height of place, and time long paſt produce ſimilar feelings; and hence the expreſſion, *Ut altius repetam!* Diſtance in paſt time, producing a ſtrong feeling, is put for any ſtrong feeling; *Nihil mihi antiquius noſtra amicitia*: Shortneſs with relation to ſpace, for ſhortneſs with relation to time; *Brevis eſſe laboro, obſcurus fio*: Suffering a puniſhment reſembles paying a debt; hence *pendere pœnas*. In the ſame manner, light may be put for glory, ſunſhine for proſperity, and weight for importance.

Many words, originally figurative, having, by long and conſtant uſe, loſt their figurative power, are degraded to the inferier rank of proper terms. Thus the words that expreſs the operation of the mind, have in all languages been originally figurative: the reaſon holds in all, that when theſe operations came firſt under conſideration, there was no other way of deſcribing them but by what they reſembled: it was not practicable to give them proper names, as may be done to objects that can be aſcertained by ſight and touch. A *ſoft* nature; *jarring* tempers, *weight* of woe, *pompous* phraſe, *beget* compaſſion, *aſſuage* grief, *break* a vow, *bend* the eye downward, *ſhower* down curſes, *drown'd* in tears, *wrapt* in joy, *warm'd* with eloquence, *loaded* with ſpoils, and a thouſand other expreſſions of the like nature, have loſt their figurative ſenſe. Some terms there are that cannot be ſaid to be altogether firative or altogether proper: originally figurative, they are tending to ſimplicity, without having loſt altogether their figurative power. Virgil's *Regina ſaucia cura*, is perhaps one of theſe expreſſions; with ordinary readers, *ſaucia* will be conſidered as expreſſing ſimply the effect of grief; but one of a lively imagination will exalt the phraſe into a figure.

For epitomiſing this ſubject, and at the ſame time for giving a clear view of it, Lord Kames * gives a liſt of the ſeveral relations upon which figures of ſpeech are commonly founded. This liſt he divides into two tables; one of ſubjects expreſſed figuratively, and one of attributes.

* *Elem. of Criticiſm*, II. 305.

TAB. I. *Subjects expreſſed figuratively.*

1. A word proper to one ſubject employed figuratively to expreſs a reſembling ſubject.

There is no figure of ſpeech ſo frequent, as what is derived from the relation of reſemblance. Youth, for example, is ſignified figuratively by the *morning* of life. The life of a man reſembles a natural day in ſeveral particulars: the morning is the beginning of a day, youth the beginning of life; the morning is cheerful, ſo is youth, &c. By another reſemblance, a bold warrior is termed the *thunderbolt* of war; a multitude of troubles, a *ſea* of troubles.

This figure, above all others, affords pleaſure to the mind by variety of beauties. Beſides the beauties abovementioned, common to all ſorts, it poſſeſſes in particular the beauty of a metaphor or of a ſimile: a figure of ſpeech built upon reſemblance, ſuggeſts always a compariſon between the principal ſubject and the acceſſory; whereby every good effect of a metaphor or ſimile may, in a ſhort and lively manner, be produced by this figure of ſpeech.

2. A word proper to the effect employed figuratively to expreſs the cauſe.

Lux for the ſun; *Shadow* for cloud. A helmet is ſignified by the expreſſion *glittering terror*; a tree by *ſhadow* or *umbrage*. Hence the expreſſion,

> Nec habet Pelion umbras. *Ovid.*
>
> Where the dun umbrage hangs. *Spring, l.* 1023.

A wound is made to ſignify an arrow:

> Vulnere non pedibus te conſequar. *Ovid.*

There is a peculiar force and beauty in this figure: the word which ſignifies figuratively the principal ſubject, denotes it to be a cauſe by ſuggeſting the effect.

3. A word proper to the cauſe employed figuratively to expreſs the effect.

Boumque labores for corn. *Sorrow* or *grief* for tears.

> Again Ulyſſes veil'd his penſive head;
> Again, unmann'd, a ſhow'r of *ſorrow* ſhed.
> Streaming *Grief* his faded cheek bedew'd.

Blindneſs for darkneſs:

> Cæcis erramus in undis. *Æneid.* iii. 200.

There is a peculiar energy in this figure, ſimilar to that in the former: the figurative name denotes the ſubject to be an effect, by ſuggeſting its cauſe.

4. The things being intimately connected, the proper name of the one employed figuratively to ſignify the other.

Day for light. *Night* for darkneſs: and hence, A ſudden night. *Winter* for a ſtorm at ſea:

> Interea magno miſceri murmure pontum,
> Emiſſamque Hyemem ſenſit Neptunus. *Æneid* i. 128.

This laſt figure would be too bold for a Britiſh writer, as a ſtorm at ſea is not inſeparably connected with winter in that climate.

5. A word proper to an attribute, employed figuratively to denote the ſubject.

Youth and *beauty* for thoſe who are young and beautiful:

> Youth and beauty ſhall be laid in duſt.

Majeſty for the king:

What art thou, that uſurp'ſt this time of night,
Together with that fair and warlike form
In which the *Majeſty* of buried Denmark
Did ſometime march? *Hamlet, act* I. *ſc.* I.

———Or have ye choſen this place
After the toils of battle, to repoſe
Your weary'd *virtue*? *Paradiſe Loſt.*

Verdure for a green field. *Summer, l.* 301.

Speaking of cranes,

The pigmy nations, wounds and death they bring,
And all the *war* deſcends upon the wing. *Iliad*, iii. 10.

Cool *age* advances venerably wiſe. *Iliad*, iii. 149.

The peculiar beauty of this figure ariſes from ſuggeſting an attribute that embelliſhes the ſubject, or puts it in a ſtronger light.

6. A complex term employed figuratively to denote one of the component parts.

Funus for a dead body. *Burial* for a grave.

7. The name of one of the component parts inſtead of the complex term.

Tæda for a marriage. The *Eaſt* for a country ſituated eaſt from us. *Jovis veſtigia ſervat*, for imitating Jupiter in general.

8. A word ſignifying time or place, employed figuratively to denote what is connected with it.

Clime for a nation, or for a conſtitution of government: hence the expreſſion, *Merciful clime*, *Fleecy winter* for ſnow, *Seculum felix*.

9. A part for the whole.

The *pole* for the earth. The *head* for the perſon:

Triginta minas pro *capite* tuo dedi. *Plautus.*

Tergum for the man:

Fugiens tergum. *Ovid.*

Vultus for the man:

Jam fulgor armorum fugaces
Terret equos, equitumque vultus. *Horat.*
Quis deſiderio ſit pudor aut modus
Tam chari *capitis*? *Horat.*
Dumque virent *genua*? *Horat.*
Thy growing virtues juſtify'd my cares,
And promis'd comfort to my *ſilver hairs*. *Iliad*, ix. 616.
———Forthwith from the pole he rears
His mighty *ſtature*. *Paradiſe Loſt.*
The ſilent *heart* with grief aſſails. *Parnel.*

The peculiar beauty of this figure conſiſts in marking that part which makes the greateſt figure.

10. The name of the container, employed figuratively to ſignify what is contained.

Grove for the birds in it; Vocal *grove*. *Ships* for the ſeamen; Agonizing *ſhips*. *Mountains* for the ſheep paſturing upon them, Bleating *mountains*. *Zacynthus*, *Ithaca*, &c. for the inhabitants. *Ex mæſtis domibus*, Livy.

11. The name of the ſuſtainer, employed figuratively to ſignify what is ſuſtained.

Altar for the ſacrifice. *Field* for the battle fought upon it, Well-fought *field*.

12. The name of the materials, employed figuratively to ſignify the things made of them.

Ferrum for *gladius*.

13. The names of the Heathen deities, employed figuratively to ſignify what they patroniſe.

Jove for the air, *Mars* for war, *Venus* for beauty, *Cupid* for love, *Ceres* for corn, *Neptune* for the ſea, *Vulcan* for fire.

This figure beſtows great elevation upon the ſubject; and therefore ought to be confined to the higher ſtrains of poetry.

Tab. II. *Attributes expreſſed figuratively.*

1. When two attributes are connected, the name of the one may be employed figuratively to expreſs the other.

Purity and virginity are attributes of the ſame perſon: hence the expreſſion, *Virgin* ſnow, for pure ſnow.

2. A word ſignifying properly an attribute of one ſubject, employed figuratively to expreſs a reſembling attribute of another ſubject.

Tottering ſtate. *Imperious* ocean. *Angry* flood. *Raging* tempeſt. *Shallow* fears.

My ſure divinity ſhall bear the ſhield,
And edge thy ſword to *reap* the glorious field.
Odyſſey, xx. 61.

Black omen, for an omen that portends bad fortune.

Ater omen. *Virgil.*

The peculiar beauty of this figure ariſes from ſuggeſting a compariſon.

3. A word proper to the ſubject, employed to expreſs one of its attributes.

Mens for *intellectus*. *Mens* for a reſolution:

Iſtam, oro, exue mentem.

4. When two ſubjects have a reſemblance by a common quality, the name of the one ſubject may be employed figuratively to denote that quality in the other:

Summer life for agreeable life.

5. The name of the inſtrument made to ſignify the power of employing it:

———Melpomene, cui liquidam pater
Vocem cum *cithara* dedit.

The ample field of figurative expreſſion diſplayed in theſe tables, affords great ſcope for reaſoning. Several of the obſervations relating to metaphor*, are applicable to figures of ſpeech: theſe ſhall be ſlightly retouched, with ſome additions peculiarly adapted to the preſent ſubject.

1. As the figure under conſideration is built upon relation, we find from experience, and it muſt be obvious from reaſon, that the beauty of it depends on the intimacy of the relation between the figurative and proper ſenſe of the word. A ſlight reſemblance, in particular, will never make this figure agreeable: the expreſſion, for example, *Drink down a ſecret*, for liſtening to a ſecret with attention, is harſh and uncouth, becauſe there is ſcarce any reſemblance between *liſtening* and *drinking*. The expreſſion *weighty crack*, uſed by Ben Johnſon for *loud crack*, is worſe if poſſible: a loud ſound has not the ſlighteſt reſemblance to a piece of matter that is weighty.

Phemius! let acts of gods, and heroes old,
What ancient bards in hall and bow'r have told,
Attemper'd to the lyre, your voice employ,
Such the pleas'd *ear will drink* with ſilent joy.
Odyſſey, i. 433.

Strepitumque exterritus *hauſit*. *Æneid*, vi. 559.

———Write, my queen,
And with mine eyes I'll *drink* the words you ſend.
Cymbeline, act I. *ſc.* 2.

As thus th' effulgence tremulous I *drink*.
Summer, l. 1684.

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* See *Metaphor.*

Neque *audit* currus habenas. *Georg.* i. 514.

O prince! (Lycaon's valiant ſon reply'd),
As thine the ſteeds, be thine the taſk to guide.
The horſes practis'd to their lord's command,
Shall *bear* the rein, and anſwer to thy hand. *Iliad*, v. 288.

The following figures of ſpeech ſeem altogether wild and extravagant, the figurative and proper meaning having no connection whatever. *Moving* ſoftneſs, Freſhneſs *breathes*, *Breathing* proſpect, *Flowing* ſpring, *Dewy* light, *Lucid* coolneſs, and many others of this falſe coin, may be found in Thomſon's *Seaſons*.

2. The proper ſenſe of the word ought to bear ſome proportion to the figurative ſenſe, and not ſoar much above it, nor ſink much below it. This rule, as well as the foregoing, is finely illuſtrated by Vida, *Poet.* iii. 148.

3. In a figure of ſpeech, every circumſtance ought to be avoided that agrees with the proper ſenſe only, not with the figurative ſenſe; for it is the latter that expreſſes the thought, and the former ſerves for no other purpoſe but to make harmony:

Zacynthus green with ever-ſhady groves,
And Ithaca, preſumptuous boaſt their loves;
Obtruding on my choice a ſecond lord,
They preſs the Hymenean rite abhorr'd.
Odyſſey, xix. 152.

Zacynthus here ſtanding figuratively for the inhabitants, the deſcription of the iſland is quite out of place: it puzzles the reader, by making him doubt whether the word ought to be taken in its proper or figurative ſenſe.

——————Write, my queen,
And with mine eyes I'll drink the words you ſend,
Though ink be made of gall. *Cymbeline, act* 1. *ſc.* 2.

The diſguſt one has to drink ink in reality, is not to the purpoſe where the ſubject is drinking ink figuratively.

4. To draw conſequences from a figure of ſpeech, as if the word were to be underſtood literally, is a groſs abſurdity; for it is confounding truth with fiction:

Be Moubray's ſins ſo heavy in his boſom,
That they may break his foaming courſer's back,
And throw the rider headlong in the liſts,
A caitiff recreant to my couſin Hereford.
Richard II. *act* 1. *ſc.* 3.

Sin may be imagined heavy in a figurative ſenſe: but weight in a proper ſenſe belongs to the acceſſory only; and therefore to deſcribe the effects of weight, is to deſert the principal ſubject, and to convert the acceſſory into a principal:

Cromwell. How does your Grace?
Wolſey. Why, well;
Never ſo truly happy, my good Cromwell.
I know myſelf now, and I feel within me
A peace above all earthly dignities,
A ſtill and quiet conſcience. The king has cur'd me,
I humbly thank his Grace: and, from theſe ſhoulders,
Theſe ruin'd pillars, out of pity, taken
A load would ſink a navy, too much honour.
Henry VIII. *act* 3. *ſc.* 6.

Ulyſſes ſpeaking of Hector:

I wonder now how yonder city ſtands,
When we have here the baſe and pillar by us.
Troilus and Creſſida, act 4. *ſc.* 9.

Othello. No; my heart is turn'd to ſtone: I ſtrike it, and it hurts my hand. *Othello, act* 4. *ſc.* 5.

Not leſs, even in this deſpicable now,
Than when my name fill'd Afric with affrights,
And froze your hearts beneath your torrid zone.
Don Sebaſtian, King of Portugal, act 1.

How long a ſpace ſince firſt I lov'd, it is!
To look into a glaſs I fear,
And am ſurpris'd with wonder, when I miſs
Grey hairs and wrinkles there.
Cowley, vol. 1. *p.* 86.

I choſe the flouriſhing'ſt tree in all the park,
With freſheſt boughs, and faireſt head:
I cut my love into its gentle bark,
And in three days behold 'tis dead;
My very written flames ſo violent be,
They've burnt and wither'd up the tree.
Cowley, vol. 1. *p.* 136.

Ah, mighty Love, that it were inward heat
Which made this precious limbeck ſweat!
But what, alas! ah, what does it avail
That ſhe weeps tears ſo wond'rous cold,
As ſcarce the aſs's hoof can hold,
So cold, that I admire they fall not hail?
Cowley, vol. 1. *p.* 132.

Such a play of words is pleaſant in a ludicrous poem.

Almeria. O Alphonſo, Alphonſo!
Devouring ſeas have waſh'd thee from my ſight,
No time ſhall raſe thee from my memory;
No, I will live to be thy monument:
The cruel ocean is no more thy tomb;
But in my heart thou art interr'd.
Mourning Bride, act 1. *ſc.* 1.

This would be very right, if there were any inconſiſtence in being interred in one place really, and in another place figuratively.

From conſidering, that a word uſed in a figurative ſenſe ſuggeſts at the ſame time its proper meaning, we diſcover a fifth rule, That we ought not to employ a word in a figurative ſenſe, the proper ſenſe of which is inconſiſtent or incongruous with the ſubject: for every inconſiſtency, and even incongruity, though in the expreſſion only and not real, is unpleaſant:

Interea genitor Tyberini ad fluminis undam
Vulnera *ſiccabat* lymphis————
Æneid, x. 833.

Tres adeo incertos cæca caligine *ſoles*
Erramus pelago, totidem ſine ſidere noctes.
Æneid, iii. 203.

The foregoing rule may be extended to form a ſixth, That no epithet ought to be given to the figurative ſenſe of a word that agrees not alſo with its proper ſenſe:

————Dicat Opuntiæ
Frater Megillæ, quo *beatus*
Vulnere. *Horat. Carm. lib.* 1. *ode* 27.
Parcus deorum cultor, et infrequens,
Inſanientis dum ſapientiæ
Conſultus erro. *Horat. Carm. lib.* 1. *ode* 54.

Seventhly, The crowding into one period or thought different figures of ſpeech, is not leſs faulty than crowding metaphors in that manner: the mind is diſtracted in the quick tranſition from one image to another, and is puzzled inſtead of being pleaſed:

I am of ladies moſt deject and wretched,
That ſuck'd the honey of his muſic vows. *Hamlet.*
My bleeding boſom ſickens at the ſound.
Odyſſey, i. 439.

————Ah miſer,
Quanta laboras in *Charybdi!*
Digne puer meliore *flamma*.
Quæ ſaga, quis te ſolvere Theſſalis
Magus *venenis*, quis poterit deus?

Vix illigatum tetriformi
Pegaſus expediet *Chimera.*
Horat. Carm. lib. I. *ode* 27.

Eighthly, if crowding figures be bad, it is ſtill worſe to graft one figure upon another: For inſtance,

While his keen falchion drinks the warriors lives.
Iliad, xi. 211.

A falchion drinking the warriors blood is a figure built upon reſemblance, which is paſſable. But then in the expreſſion, *lives* is again put for *blood*; and by thus grafting one figure upon another, the expreſſion is rendered obſcure and unpleaſant.

Ninthly, Intricate and involved figures, that can ſcarce be analyſed, or reduced to plain language, are leaſt of all tolerable:

Votis incendimus aras. *Æneid.* iii. 279.

——————Onerentque caniſtris
Dona laboratæ Cereris *Æneid.* viii. 180.

Vulcan to the Cyclopes:

Arma acri facienda viro, nunc viribus uſus,
Nunc manibus rapidis, omni nunc arte magiſtra.
Præcipitate moras. *Æneid.* viii. 441.

————Huic gladio, perque ærea ſcuta.
Per tunicam ſqualentem auro, latus *haurit* apertum.
Æneid. x. 313.

Scriberis Vario fortis, et hoſtium
Victor, Mæonii carminis *alite.*
Horat. Garm. lib. I. *ode* 6.

Elſe ſhall our fates be number'd with the dead.
Iliad, v. 294.

Commutual death the fate of war confounds.
Iliad, viii. 85. *and* xi. 117.

Speaking of Proteous.

Inſtant he wears, excluſive of the rape,
The mimic force of every ſavage ſhape. *Odyſſey*, iv. 563.
Rolling convulvſie on the floor, is ſeen
The piteous object of a proſtrate queen *Ibid* iv. 652.
The mingling tempeſt weaves its gloom. *Autumn*, 337.
A various ſweetneſs ſwells the gentle race. *Ibid.* 640.
The diſtant water-fall ſwells in the breeze. *Winter*, 738.

In the tenth place, When a ſubject is introduced by its proper name, it is abſurd to attribute to it the properties of a different ſubject to which the word is ſometimes applied in a figurative ſenſe:

Hear me, oh Neptune! thou whoſe arms are hurl'd
From ſhore to ſhore, and gird the ſolid world.
Odyſſey, ix. 917.

Neptune is here introduced perſonally, and not figuratively for the ocean: the deſcription therefore, which is only applicable to the latter, is altogether improper.

It is not ſufficient that a figure of ſpeech be regularly conſtructed, and be free from blemiſh: it requires taſte to diſcern when it is proper, when improper; and taſte perhaps is our only guide. One, however, may gather from reflections and experience, that ornaments and graces ſuit not any of the diſpiriting paſſions, nor are proper for expreſſing any thing grave and important. In familiar converſation, they are in ſome meaſure ridiculous: Proſpero, in the *Tempeſt*, ſpeaking to his daughter Miranda, ſays,

The fringed curtains of thine eyes advance,
And ſay what thou ſeeſt yond.

No exception can be taken to the juſtneſs of the figure; and circumſtances may be imagined to make it proper: but it is certainly not proper in familiar converſation.

In the laſt place, Though figures of ſpeech have a charming effect when accurately conſtructed and properly introduced, they ought, however, to be ſcattered with a ſparing hand: nothing is more luſcious, and nothing conſequently more ſatiating, than redundant ornaments of any kind.

Figure is uſed, in theology, for the myſteries repreſented or delivered obſcurely to us under certain types or actions in the Old Teſtament. Thus manna is held a figure or type of the euchariſt; and the death of Abel a figure of the ſufferings of Chriſt.

Many divines and critics contend, that all the actions, hiſtories, ceremonies, &c. of the Old Teſtament, are only figures, types, and prophecies, of what was to happen under the New. The Jews are ſuppoſed to have had the figures or ſhadows, and we the ſubſtance.

Figure is alſo applied in a like ſenſe to profane matters: as the emblems, enigmas, fables, ſymbols, and hieroglyphics, of the ancients.

FIGURED, in general, ſomething marked with figures.

The term *figured* is chiefly applied to ſtuffs, whereon the figures of flowers and the like, are either wrought or ſtamped.

Figured, in muſic, is applied either to ſimple notes or to harmony: to ſimple notes, as in theſe words *figured baſs*, to expreſs a baſs whoſe notes carrying chords are ſubdivided into many other notes of leſſer value; to harmony, when, by ſuppoſition and in a diatonic procedure, other notes than thoſe which form the chord are employed. ſee Supposition.

To *figure* is to paſs ſeveral notes for one; to form runnings or variations; to add ſome notes to the air, in whatever manner it be done; in ſhort, it is to give to harmonious ſounds a figure of melody, by connecting them with other intermediate ſounds.

FILAGO, in botany: A genus of the polygamia ſuperflua order, belonging to the ſyngeneſia claſs of plants; and in the natural method ranking under the 49th order, *Compoſitæ*. The receptacle is naked; there is no pappus; the calyx is imbricated; the female florets placed among the ſcales of the calyx.

FILAMENT, in anatomy, natural hiſtory, &c. a term uſed in the ſame ſenſe with fibre, for thoſe fine threads whereof the fleſh, nerves, ſkin, plants, roots, &c. are compoſed. Se Fibre.

Vegetable Filaments form a ſubſtance of great uſe in the arts and manufactures: furniſhing thread, cloth, cordage, &c.

For theſe purpoſes the filamentous parts of the *Cannabis* and *Linum*, or hemp and flax, are employed among us *. But different vegetables have been employed in different countries for the ſame uſes. Putrefaction deſtroys the pulpy or fleſhy matter, and leaves the tough filaments entire: By curiouſly putrefying the leaf of a plant in water, we obtain the fine flexile fibres which conſtituted the baſis of the ribs and minute veins, and which now form as it were a ſkeleton of the leaf. Alkaline lixivia, in ſome degree, produce ſimilar effects to putrefaction.

The Sieur de Flacourt, in his hiſtory of Madagaſcar, relates, that different kinds of cloth are prepared in

* See *Hemp* and *Flax*; alſo *Cotton*.

in that iſland from the filaments of the bark of certain trees boiled in ſtrong lye ; that ſome of theſe cloths are very fine, and approach to the ſoftneſs of ſilk, but in durability come ſhort of cotton ; that others are coarſer and ſtronger, and laſt thrice as long as cotton ; and that of theſe the ſails and cordage of his veſſel were made. See alſo the article Bark.

The ſame author informs us, that the ſtalks of nettles are uſed for the like purpoſes in his own country, France. And Sir Hans Sloane relates, in one of his letters to Mr Ray, that he has been informed by ſeveral, that muſlin and callico, and moſt of the Indian linens, are made of nettles.

In ſome of the Swediſh provinces, a ſtrong kind of cloth is ſaid to be prepared from hop-ſtalks : and in the tranſactions of the Swediſh academy for the year 1750, there is an account of an experiment made in conſequence of that report. Of the ſtalks, gathered in autumn, about as many were taken, as equalled in bulk a quantity of flax that would have produced a pound after preparation. The ſtalks were put into water, and kept covered therewith during the winter. In March they were taken out, dried in a ſtove, and dreſſed as flax. The prepared filaments weighed nearly a pound, and proved fine, ſoft, and white : They were ſpun and woven into ſix ells of fine ſtrong cloth. The author, Mr Shiſler, obſerves, that hop-ſtalks take much longer time to rot than flax ; and that, if not fully rotted, the woody part will not ſeparate, and the cloth will neither prove white nor fine.

Hemp, flax, and all other vegetable filaments, and thread or cloth prepared from them, differ remarkably from wool, hair, ſilk, and other animal productions, not only in the principles into which they are reſoluble by fire, but likewiſe in ſome of their more intereſting properties, particularly in their diſpoſition to imbibe colouring matters ; ſundry liquors, which give a beautiful and durable dye to thoſe of the animal, giving no ſtain at all to thoſe of the vegetable kingdom.

A ſolution of copper in aquafortis, which had been changed blue by an addition of volatile ſpirit, on being mixed with a little ſolution of tin, became turbid and greeniſh. Pieces of white ſilk and flannel boiled, without any previous preparation, in this mixture, received a bright deep yellow dye ; whilſt pieces of linen, prepared and unprepared, came out as colourleſs as they were put in.

Fiſhing-nets are uſually boiled with oak-bark or other like aſtringents, which render them more laſting.— Thoſe made of flax receive from this decoction a browniſh colour, which, by the repeated alternations of water and air, is in a little time diſcharged, whilſt the fine gloſſy brown, communicated by the ſame means to ſilken nets, permanently reſiſts both the air and water, and ſtands as long as the animal filaments themſelves. In like manner the ſtain of ink, or the black dye from ſolutions of iron, mixed with vegetable aſtringents, proves durable in ſilk and woollen ; but from linen, the aſtringent matter is extracted by waſhing, and only the yellow iron-mould remains.

The red decoction of cochineal, which, heightened with a little ſolution of tin, gives the fiery ſcarlet dye to wool or ſilk that have been previouſly impregnated with ſolution of tartar, makes no impreſſion upon linen or cotton prepared in the ſame manner. M. du Fay informs us in the Memoirs of the French Academy for the year 1737, that having prepared a mixed cloth whoſe warp was of wool and the woof of cotto, and thoroughly blended the two together by fulling, he ſtill found the cotton to reſiſt the action of the ſcarlet liquor, and the wool to receive the ſame colour from it as wool by itſelf, the ſtuff coming out all over marbled fiery and white.

Many other inſtances of this kind are known too well to the callico-printer ; whoſe grand deſideratum it is, to find means of making linen receive the ſame colours that wool does. The phyſical cauſe of the difference is wholly unknown ; and indeed, of the theory of dyes in general, we know as yet extremely little. (See Dyeing.) Are animal filaments tubular, and the colouring atoms received within them ? Are vegetable filaments ſolid, and the colour depoſited on the ſurface ? Or does not their different ſuſceptibility of colour depend rather on the different intrinſic properties of the two ? There are many inſtances of a like diverſity, even in the metallic kingdom, where a mechanical difference in texture can ſcarcely be preſumed to be the cauſe : Thus ſilver receives a deep ſtain from ſulphureous or putrid vapours, or the yolk of a boiled egg, which have no effect upon tin.

Filaments, among botaniſts. See Botany, p. 434, col. 1.

FILANDERS, in falconry, a diſeaſe in hawks, &c. conſiſting of filaments or ſtrings of blood coagulated ; and occaſioned by a violent rupture of ſome vein, by which the blood, extravaſating, hardens into theſe figures, and incommodes the reins, hips, &c.

Filanders, are alſo worms as ſmall as thread, and about an inch long, that lie wrapt up in a thin ſkin or net, near the reins of an hawk, apart from either gut or gorge.

This malady is known by the hawk's poverty ; by ruffling her tail ; by her ſtraining the fiſt, or perch, with her pounces ; and laſtly, by croaking in the night, when the filanders prick her. The diſeaſe proceeds from bad food ; and muſt be remedied in time, to prevent its ſpreading over the whole body, and deſtroying the bird. Theſe muſt not be killed as other worms are, for fear of impoſthumes from their corruption, being incapable of paſſing away with the hawk's meat. They muſt only be ſtupified, to prevent their being offenſive ; and this done by giving the hawk a clove of garlic, after which ſhe will feel nothing of the filanders for 40 days. It will be prudent in the falconer, when he obſerves the hawk poor and low, to give her a clove of garlic once a-month by way of prevention.

FILBERT, or Filberd, the fruit of the corylus, or hazel. See Corylus.

FILE, among mechanics, a tool uſed in metal, &c. in order to ſmooth, poliſh, or cut.

This inſtrument is of iron or forged ſteel, cut in little furrows, with chiſſels and a mallet, this and that way, and of this or that depth, according to the grain or touch required. After cutting the file, it muſt be tempered with a compoſition of chimney-ſoot, very hard and dry, diluted and wrought up with urine, vinegar, and ſalt ; the whole being reduced to the conſiſtence of muſtard. Tempering the files conſiſts in rubbing them over with this compoſition, and covering them in loam; after which they are put in a charcoal fire, and taken out by that time they have acquired a cherry colour, which is known by a ſmall rod of the ſame ſteel put in along with them. Being taken out of the fire, they are thrown into the cold ſpring-water; and when cold, they are cleaned with charcoal and a rag; and being clean and dry, are kept from ruſt by laying them up in wheat bran. Iron files require more heating than ſteel ones. Files are of different forms, ſizes, cuts, and degrees of fineneſs, according to the different uſes and occaſions for which they are made. See Filing.

File, in the art of war, a row of ſoldiers, ſtanding one behind an another, which is the depth of the battalion or ſquadron. The files of a battalion of foot are generally three deep; as are ſometimes thoſe of a ſquadron of horſe. The files muſt be ſtraight and parrallel one to another.

File, in law, a thread, ſtring, or wire, upon which writs and other exhibits in courts and offices are faſtened or filed, for the more ſafe keeping, and ready turning to the ſame. A file is a record of the court; and the filing of a proceſs of a court makes it a record of it. An original writ may be filed after judgment given in the cauſe, iſſued forth before; declarations, &c. are to be filed, and affidavits muſt be filed, ſome before they are read in court, and ſome preſently when read in court. Before filing a record removed by *certiorari*, the juſtices of B. R. may refuſe to receive it, if it appears to be for delay, &c.; and remand it back for the expedition of juſtice: but if the *certiorari* be once filed, the proceedings below cannot be revived. An indictment, &c. cannot be amended after it is filed.

FILIAL, ſomething belonging to the relation of ſon. See Son.

The divines uſually diſtinguiſh between a *ſervile* and a *filial* fear. The moſt abandoned may have a ſervile fear of God, ſuch as that of a ſlave to his maſter; but not a filial fear, *i. e.* a fear reſulting from love and reſpect. See Fear.

Filial Piety, the affectionate attachment of children to their parents; including in it love, reverence, obedience, and relief. Theſe are duties prompted equally by nature and by gratitude, independent, of the injunctions of religion. For where ſhall we find the perſon who hath received from any one benefits ſo great or ſo many, as children from their parents? And it may be truly ſaid, that if perſons are undutiful to their parents, they ſeldom prove good to any other relation. Profane hiſtory furniſhes many fine examples of this amiable virtue; a few of which we ſhall ſelect, according to the plan obſerved in other ſimilar articles.

1. The Roman dictator T. Manlius having exerciſed great cruelty over the citizens, was cited at the expiration of his office to anſwer for his conduct. Among other things that were laid to his charge, he was accuſed of treating with barbarity one of his own ſons. Manlius, according to Livy, had no other cauſe of complaint againſt this ſon than his having an impediment in his ſpeech. For this reaſon he was baniſhed far from the city, from his home, and the company of thoſe of his own age and fortune, and condemned to ſervile works. All were highly exaſperated againſt ſuch inhuman conduct, except the ſon himſelf, who, under the greateſt concern that he ſhould furniſh matter of accuſation againſt his father, reſolved upon a moſt extraordinary method to relieve him. One morning, without appriſing any body, he came to the city armed with a dagger, and went directly to the houſe of the tribune Pomponius, who had acccuſed his father. Pomponius was yet in bed. Young Manlius ſent up his name, and was immediately admitted by the tribune, who did not doubt but we was come to diſcover to him ſome new inſtances of his father's ſeverity. But Manlius, as ſoon as he was left alone with the tribune, drew out his dagger, and preſented it to his breaſt; declaring he would ſtab him that moment if he did not ſwear in the form he ſhould dictate, "Never to hold the aſſembly of the people for accuſing his father." Pomponius, who ſaw the dagger glittering at his breaſt, himſelf alone without arms, and attacked by a robuſt young man full of a bold confidence in his own ſtrength, took the oath demanded of him; and afterwards confeſſed with a kind of complacency in the thing, and a ſincerity which ſufficiently argued he was not ſorry for what he had done, that it was that violence which obliged him to deſiſt from his deſign.

Liv. l. 7. c. 4, 5.

2. Among the multitude of perſons who were proſcribed under the ſecond triumvirate of Rome, were the celebrated orator Cicero and his brother Quintus. The fate of the former, in endeavouring to make his eſcape, is related under the article Cicero. The latter found means to conceal himſelf ſo effectually at home, that the ſoldiers could not find him. Enraged at their diſappointment, they put his ſon to the torture, in order to make him diſcover the place of his father's concealment; but filial affection was proof againſt the moſt exquiſite torments. An involuntary ſigh, and ſometimes a deep groan, was all that could be extorted from the youth. His agonies were increaſed; but with amazing fortitude he ſtill perſiſted in his reſolution of not betraying his father. Quintus was not far off; and it may be imagined better than can be expreſſed, how his heart muſt have been affected with the ſighs and groans of a ſon expiring in tortures to ſave his life. He could bear it no longer; but quitting the place of his concealment, he preſented himſelf to the aſſaſſins, begging of them to put him to death, and diſmiſs the innocent youth, whoſe generous behaviour the triumvirs themſelves, if informed of the fact, would judge worthy of the higheſt approbation. But the inhuman monſters, without being the leaſt affected with the tears either of the father or the ſon, anſwered, that they both muſt die; the father becauſe he was proſcribed, and the ſon becauſe he had concealed his father. Then a new conteſt of tenderneſs aroſe who ſhould die firſt; but this the aſſaſſins ſoon decided, by beheading them both at the ſame time.—This anecdote is related by Appian, Dio, Plutarch, Valerius Maximus, and other hiſtorians.

Plut. in vita Pomp.

3. Cinna, who ſcrupled no attempt, how atrocious ſoever, which could ſerve his purpoſe, undertook to get Pomponius Strabo murdered in his tent; but his ſon ſaved his life, which was the firſt remarkable action of Pompey the Great. The treacherous Cinna, by many alluring promiſes, had gained over one Terentius, a confident of Pompey's, and prevailed on him to aſſaſſinate the general, and ſeduce his troops. Young

Pompey being informed of this deſign a few hours before it was to be put in execution, placed a faithful guard round the prætorium; ſo that none of the conſpirators could come near it. He then watched all the motions of the camp, and endeavoured to appeaſe the fury of the ſoldiers, who hated the general his father, by ſuch acts of prudence as were worthy of the oldeſt commanders. However, ſome of the mutineers having forced open one of the gates of the camp, in order to deſert to Cinna, the general's ſon threw himſelf flat on his back in their way, crying out, that they ſhould not break their oath and deſert their commander, without treading his body to death. By this means he put a ſtop to their deſertion, and afterwards wrought ſo effectually upon them by his affecting ſpeeches and engaging carriage, that he reconciled them to his father.

4. Olympias, Alexander's own mother, was of ſuch an unhappy diſpoſition, that he would never allow her to have any concern in the affairs of the government. She uſed frequently to make very ſevere complaints on that account; but he always ſubmitted to her ill-humour with great mildneſs and patience. Antipater, one of his friends, having one day written a long letter againſt her to the king then abſent, the latter, after reading it, replied, "Antipater does not know that one ſingle tear ſhed by a mother will obliterate ten thouſand ſuch letters as this." A behaviour like this, and ſuch an anſwer, ſhow at one and the ſame time, that Alexander was both an affectionate ſon and an able politician.

Q. Curtius.

5. Epaminondas is univerſally acknowledged to have been one of the greateſt generals and one of the beſt men which Greece ever produced. Before him the city of Thebes was not diſtinguiſhed by any memorable action, and after him it was not famous for its virtues, but its misfortunes, till it ſunk into its original obſcurity; ſo that it ſaw its glory take birth and expire with this great man. The victory he obtained at Leuctra had drawn the eyes and admiration of all the neighbouring people upon Epaminondas, who looked upon him as the ſupport of Thebes, as the triumphant conqueror of Sparta, as the deliverer of Greece: in a word, as the greateſt man, and the moſt excellent captain, that ever was in the world. In the midſt of this univerſal applauſe, ſo capable of making the general of an army forget the man for the victor, Epaminondas, little ſenſible to ſo affecting and ſo deſerved a glory, "My joy (ſaid he) ariſes from my ſenſe of that which the news of my victory will give my father and my mother."

6. Among an incredible number of illuſtrious perſons who were falſely accuſed and put to death by Nero, was one Bareas Soranus; a man, as Tacitus informs us, of ſingular vigilance and juſtice in the diſcharge of his duty. During his confinement, his daughter Servilia was apprehended and brought into the ſenate, and there arraigned. The crime laid to her charge was, that ſhe had turned into money all her ornaments and jewels, and the moſt valuable part of her dreſs, to defray the expence of conſulting magicians. To this the young Servilia, with tears, replied, That ſhe had indeed conſulted magicians, but the whole of her inquiry was to know whether the emperor and ſenate would afford protection and ſafety to her dear and indulgent parent againſt his accuſers. "With this view (ſaid ſhe) I preſented the diviners, men till now utterly unknown to me, with my jewels, apparel, and the other ornaments peculiar to my quality, as I would have preſented my blood and life, could my blood and life have procured my father's liberty. But whatever this my proceeding was, my unfortunate father was an utter ſtranger to it; and if it is a crime, I alone am the delinquent." She was, however, together with her father, condemned to die; but in what manner, hiſtory is ſilent. [Vid. *Taciti Annales*, lib. 6. cap. 20.]

7. Valerius Maximus* likewiſe relates a very ſingular fact upon this ſubject. A woman of illuſtrious birth had been condemned to be ſtrangled. The Roman prætor delivered her up to the triumvir, who cauſed her to be carried to priſon, in order to her being put to death. The goaler, who was ordered to execute her, was ſtruck with compaſſion, and could not reſolve to kill her. He chooſe therefore to let her die of hunger. Beſides which, he ſuffered her daughter to ſee her in priſon; taking care, however, that ſhe brought her nothing to eat. As this continued many days, he was ſurpriſed that the priſoner lived ſo long without eating; and ſuſpecting the daughter, upon watching her, he diſcovered that ſhe nouriſhed her mother with her own milk. Amazed at ſo pious, and at the ſame time ſo ingenious an invention, he told the fact to the triumvir, and the triumvir to the prætor, who believed the thing merited relating in the aſſembly of the people. The criminal was pardoned, and a decree was paſſed that the mother and daughter ſhould be ſubſiſted for the reſt of their lives at the expence of the public.

The ſame author gives a ſimilar inſtance of filial piety in a young woman named Xantippe to her aged father Cimonus, who was likewiſe confined in priſon, and which is univerſally known by the name of the *Roman Charity*. Both theſe inſtances appeared ſo very extraordinary and uncommon to that people, that they could only account for them, by ſuppoſing that the love of children to their parents was the the firſt law of nature. *Putaret aliquis* (ſays our author) *hoc contra naturam factum eſſe, niſi prima naturæ lex eſſet diligere parentes.*

In addition to the foregoing examples, we may refer to the article Etna, nº 51. par. 3. where a very noble inſtance of filial piety is taken notice of. See alſo the article Pietas.

FILIBEG, or Fillebeg. See Philibeg.

FILICACIA (Vincent), a celebrated Italian poet, was born at Florence in 1642. He was a member of the Academy della Cruſca and of that of the Arcadi, and became ſecretary to the duke of Tuſcany. He died in 1707. His poems are much eſteemed for the delicacy and nobleneſs of their ſentiments. Scipio de Filicacia, his ſon, had them all printed together, under, the title of *Poeſie Foſiano di Vincenzo da Filicacia*, in 1707, 4to.

FILICES, (from *filum* "a thread," *quaſi filatim inciſa*), Ferns; one of the ſeven tribes or families of the vegetable kingdom, according to Linnæus, by whom it is thus characterized: "having their fructification on the back ſide of the frondes." They conſtitute the firſt order in the claſs cryptogamia; and conſiſt of

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* Lib. v. 4. *Plinii Hiſt.* lib. vii. 36.

16 genera, which are divided into *fructificationes, ſpicatæ, frondoſæ, & radicales*. This order comprehends the entire xvith claſs of Tournefort, in whoſe ſyſtem the filices make only a ſingle genus, in the firſt ſection of the abovementioned claſs.

FILICES, is alſo an order of plants in the *fragmenta methodi naturalis* of Linnæus. See Botany, p. 469. col. 2.

FILIGRANE, Filigree, or Fillagree, *Work*. See Fillagree.

FILING, one of the principal operations in ſmithery, &c. ſucceeding to forging. See File.

The coarſer cut files are always to be ſucceeded by finer; and in all the kinds the rule is, to lean heavy on the file in thruſting it forward, becauſe the teeth of the file are made to cut forwards. But in drawing the file back again for a ſecond ſtroke, it is to be lightly lifted juſt above the work, by reaſon it cuts not coming back.

The rough or coarſe-toothed file (which, when large, is called a *rubber*) ſerves to take off the unevenneſſes of the work left by the hammer in forging.

The baſtard-toothed file is to take out too deep cuts, and file ſtrokes made by the rough file. The fine-toothed file takes out the cuts or file-ſtrokes the baſtard file made; and the ſmooth file thoſe left by the fine file.

In this order, the files of ſeveral cuts are to ſucceed each other till the work is as ſmooth as it can be filed. After which it may be made yet ſmoother with emery, tripoli, &c. See Polishing.

FILIPENDULA, in botany. See Spiræa.

FILIX, in botany. See Filices.

FILLAGREE, Filigree, or Filigrane, *work*, a kind of enrichment on gold or ſilver, wrought delicately, in manner of little threads or grains, or both intermixed. The word is compounded of *fil* or *filum* "thread," and *granum* "grain." In Latin it is called *filatim elaboratum opus, argentum, aurum*.

Marſden's Account of Sumatra, p. 141.

There is no manufacture in any part of the world, that has been more admired and celebrated, than the fine gold and ſilver fillagree of Sumatra. And what renders it a matter of greater curioſity is the coarſeneſs of the tools employed in the workmanſhip, and which, in the hands of an European, would not be thought ſufficiently perfect for the moſt ordinary purpoſes.—They are rudely and inartificially formed, by the goldſmith (*pandi*), from any old iron he can pick up. When you engage one of them to execute a piece of work, his firſt requeſt is uſually for a piece of iron hoop, to make his wire-drawing inſtrument; an old hammer head, ſtuck in a block, ſerves for an anvil; and a pair of compaſſes is often compoſed of two old nails tied together at one end. The gold is melted in a piece of *preeoo* or earthen rice-pot, or ſometimes in a crucible of their own make, of ordinary clay. In general they uſe no bellows, but blow the fire with their mouths, through a joint of bamboo; and if the quantity of metal to be melted is conſiderable, three or four perſons ſit round their furnace, which is an old broken quallee or iron pot, and blow together. At Padang alone, where the manufacture is more conſiderable, they have adopted the Chineſe bellows. Their method of drawing the wire differs but little from that uſed by European workmen. When drawn to a ſufficient fineneſs, they flatten it by beating it on their anvil; and when flattened, they give it a twiſt like that in the whalebone handle of a punch ladle, by rubbing it on a block of wood with a flat ſtick. After twiſting they again beat it on the anvil, and by theſe means it becomes flat wire with indented edges. With a pair of nippers they fold down the end of the wire, and thus form a leaf, or element of a flower in their work, which is cut off. The end is again folded and cut off, till they have got a ſufficient number of leaves, which are laid on ſingly. Patterns of the flowers or foliage, in which there is not very much variety, are prepared on paper, of the ſize of the gold plate on which the fillagree is to be laid. According to this, they begin to diſpoſe on the plate the larger compartments of the foliage, for which they uſe plain flat wire of a larger ſize, and fill them up with the leaves before mentioned. To fix the work, they employ a glutinous ſubſtance, made of the red hot berry called *boca ſago*, ground to a pulp on a rough ſtone. This pulp they placed on a young cocoa-nut about the ſize of a walnut, the top and bottom being cut off. After the leaves have been all placed in order, and ſtuck on, bit by bit, a ſolder is prepared of gold-filings and borax, moiſtened with water which they ſtrew over the plate; and then putting it in the fire for a ſhort time, the whole becomes united. This kind of work on a gold plate, they call *carrang papan*: when the work is open, they call it *carrang trouſe*. In executing the latter, the foliage is laid out on a card, or ſoft kind of wood, and ſtuck on, as before deſcribed, with the ſago berry; and the work, when finiſhed, being ſtrewed over with their ſolder, is put into the fire, when the card or ſoft wood burning away, the gold remains connected. If the piece be large, they ſolder it at ſeveral times. In the manufacture of badjoo buttons, they firſt make the lower part flat, and having a mould formed of a piece of buffalo's horn, indented to ſeveral ſizes, each like one half a bullet mould, they lay their work over one of theſe holes, and with a horn punch they preſs it into the form of the button. After this they complete the upper part. When the fillagree is finiſhed, they cleanſe it, by boiling it in water with common ſalt and alum, or ſometimes lime juice; and in order to give it that fine purple colour which they call *ſapo*, they boil it in water with brimſtone. The manner of making the little balls with which their works are ſometimes ornamented, is as follows. They take a piece of charcoal, and having cut it flat and ſmooth, they make in it a ſmall hole, which they fill with gold duſt, and this melted in the fire becomes a little ball. They are very inexpert at finiſhing and poliſhing the plain parts, hinges, ſcrews; and the like, being in this as much excelled by the European artiſts, as theſe fall ſhort of them in the fineneſs and minuteneſs of the foliage. The Chineſe alſo make fillagree moſtly of ſilver, which looks elegant, but wants likewiſe the extraordinary delicacy of the Malay work. The price of the workmanſhip depends upon the difficulty or uncommonneſs of the pattern. In ſome articles of uſual demand, it does not exceed one-third of the value of the gold; but in matters of fancy, it is generally equal to it.

FILLET, or Filet, in architecture, denotes a little ſquare member or ornament uſed in divers places and on divers occaſions, but generally as a corona over a greater moulding.

The fillet is the ſame with what the French call *reglet*, *bande*, and *bandelette*; the Italians *liſta* or *liſtella*.

Fillet, in heraldry, a kind of orle or bordure, containing only a third or fourth part of the breadth of the common bordure. It is ſuppoſed to be withdrawn inwards, and is of a different colour from the field. It runs quite round, near the edge, as a lace over a cloak.

Fillet is alſo uſed for an ordinary drawn like the bar from the ſiniſter point of the chief acroſs the ſhield, in manner of a ſcarf; though it is ſometimes alſo ſeen in the ſituation of a bend, feſſe, croſs, &c.

According to Guillim, the fillet is a fourth part of the chief, and is placed in the chief point of the eſcutcheon.

Fillet is alſo uſed among painters, gilders, &c. for a little rule or reglet of leaf-gold, drawn over certain mouldings; or on the edges of frames, pannels, &c. eſpecially when painted white, by way of enrichment.

Fillets, in the manege, are the loins of a horſe, which begin at the place where the hinder part of the ſaddle reſts.

FILLY, a term among horſe-dealers, to denote the female or mare-colt.

FILM, a thin ſkin or pellicle. In plants, it is uſed for that thin, woody ſkin, which ſeparates the ſeeds in the pods, and keeps them apart.

FILTER, or Filtre, in chemiſtry, &c. a piece of woollen cloth, linen, paper, or other matter, ſome of which are in the form of hollow inverted cones, uſed to filtrate or ſtrain liquors through. The filtre has the ſame uſe and effect with regard to liquids that the ſieve or ſearce has in dry matter.

Filters are of two ſorts. The firſt are ſimple pieces of paper or cloth, through which the liquor is paſſed without farther trouble. The ſecond are twiſted up like a ſkain or wick, and firſt wetted, then ſqueezed, and one end put in the veſſel that contains the liquor to be filtrated; the other end is to be out, and hang down below the ſurface of the liquor; by means hereof the pureſt part of the liquor diſtills drop by drop out of the veſſel, leaving the coarſer part behind. This filter acts as a ſiphon.

Filter is alſo a charm, ſuppoſed to have a virtue of inſpiring love. The word is derived from φιλτρον which ſignifies the ſame thing, of φιλεω, *amo* 'I love.'

The Greeks, when their love was without ſucceſs, had ſeveral arts to procure the affections of their beloved. The Theſſalian women were famous for their ſkill in this as well as other magical practices. The means whereby it was effected were of divers ſorts; it was ſometimes done by potions called φιλτρα, which are frequently mentioned in authors of both languages. Juvenal ſpeaks thus:

> *Hic magicus affert cantus, bic Theſſala vendit*
> Philtra, *quibus valeant mentem vexare mariti.*

Their operations were violent and dangerous, and commonly deprived ſuch as drank them of their reaſon. Plutarch and Cornelius Nepos report, that Lucullus the Roman general firſt loſt his reaſon, and afterwards his life by one of them. Lucretius the poet ended his life by the ſame way; and Caius Caligula, as Suetonius reports, was driven into a fit of madneſs by a filter given him by his wife Cæſonia, which ſtory is mentioned by the ſame poet. Ovid likewiſe aſſures us, that this was the uſual effect of ſuch potions.

The ingredients they were made of were of various ſorts; ſeveral of which applied by themſelves were thought effectual.

FILTRATION, the act of paſſing any liquor through a filter, called alſo *colature*, *percolation*, and *tranſcolation*. See Filter, and Chemistry, nº 568.

FIMBRIÆ, *Fringes*. The extremities or borders of the tubæ Fallopianæ were formerly thus called; the word ſignifying a *fringed border* which that part reſembles.

FIMBRIATED, in heraldry, an ordinary with a narrow border or hem of another tincture.

FIN, in natural hiſtory, a well-known part of fiſhes, conſiſting of a membrane ſupported by rays, or little bony or cartilaginous oſſicles.

The office of the fins has commonly been ſuppoſed to be analagous to that of feathers in fowls; and to aſſiſt the fiſh in its progreſſive motion, or ſwimming: but the later naturaliſts find this a miſtake.

The tail is the great inſtrument of ſwimming: the fins only ſerve to keep the fiſh upright, and prevent vacillation or wavering. See Ichthyology.

FINAL, in general, whatever terminates or concludes a thing; as *final* judgment, *final* ſentence, &c.

Final Cauſe, is the end for which the thing is done. The final cauſe is the firſt thing in the intention of a perſon who does a thing; and the laſt in the execution. See Cause.

Final Letters among the Hebrew grammarians, five letters ſo called, becauſe they have a different figure at the end of words from what they have in any other ſituation.

Final, in geography, a port-town of Italy, ſubject to Genoa, and ſituated on the Mediterranean, about 37 miles ſouth-weſt of that city. It was ſold to the Genoeſe in 1713, by the emperor Charles VI. E. Long. 9. 12. N. Lat. 44. 30.

FINANCES, in the French policy, denote the revenues of the king and ſtate: much the ſame with the treaſury or exchequer of the Engliſh, and the fiſcus of the Romans.—The word is derived from the German *finantz*, "ſcraping, uſury." Though Du Cange chooſes rather to deduce it from the barbarous Latin *financia, præſtatio pecuniaria.*

Council of the Finances, correſponds to the lords-commiſſioners of the treaſury in Britain: the comptroller-general of the *finances*; to the lord high treaſurer, &c.

The French have a peculiar kind of figures, or numeral character, which they call *chiffre de finance.*

Finch-kind, in ornithology, an appellation given to a genus of birds known among authors by the name of Fringilla. See that article.

Finch (Heneage), earl of Nottingham, the ſon of Sir Heneage Finch, ſome time recorder of London, and of a younger branch of the Winchelſea family, was born in 1621. By his good parts and diligence, he became a noted proficient in the municipal laws; was made ſolicitor-general by Charles II. on his reſtoration, and was very active in the proſecution of the regicides. In 1670, he was appointed attorney-general; about three years after, lord keeper of the great ſeal, on the removal of the earl of Shafteſbury; and lord chancellor in 1675. He was created earl of Nottingham in 1681; and died the year following, being quite worn out by the fatigues of buſineſs. He publiſhed ſeveral ſpeeches on the trials of the judges of king Charles I. with ſome few other things; and left behind him Chancery Reports in MS.

FINE, that which is pure and without mixture. The term is particularly uſed in ſpeaking of gold or ſilver.

Fine, in law, hath divers applications. Sometimes it is uſed for a formal conveyance of lands or tenements, or of any thing inheritable, being *in eſſe temporis finis*, in order to cut off all controverſies. Others define it to be a final agreement between perſons, concerning any lands or rents, &c. of which any ſuit or writ is depending between them in any court.

Fine, ſometimes ſignifies a ſum of money paid for entering lands or tenements let by leaſe; and ſometimes a pecuniary mulct for an offence committed againſt the king and his laws, or againſt the lord of the manor.

Blackſt. Comment.

Fines for Alienation, in feodal law. One of the attendants or conſequences of tenure by vaſſalſhip. *Knight-Service*, was that of fines due to the lord for every alienation, whenever the tenant had occaſion to make over his land to another. This depended on the nature of the feodal connection; it not being reaſonable nor allowed, that a feudatory ſhould transfer his lord's gift to another, and ſubſtitute a new tenant to do the ſervice in his own ſtead, without the conſent of the lord: and, as the feodal obligation was conſidered as reciprocal, the lord alſo could not alienate his ſeignory without the conſent of his tenant, which conſent of his was called an *attornment*. This reſtraint upon the lord ſoon wore away: that upon the tenant continued longer. For, when every thing came in proceſs of time to be bought and ſold, the lords would not grant a licence to their tenants to aliene, without a fine being paid; apprehending that, if it was reaſonable for the heir to pay a fine or relief on the renovation of his paternal eſtate, it was much more reaſonable that a ſtranger ſhould make the ſame acknowledgment on his admiſſion to a newly purchaſed feud. In England, theſe fines ſeem only to have been exacted from the king's tenants *in capite*, who were never able to aliene without a licence: but as to common perſons, they were at liberty, by *magna charta*, and the ſtatute of *quia emptores* (if not earlier), to aliene the whole of their eſtate, to be holden of the ſame lord as they themſelves held it of before. But the king's tenants *in capite*, not being included under the general words of theſe ſtatutes, could not aliene without a licence: for if they did, it was in ancient ſtrictneſs an abſolute forfeiture of the land; though ſome have imagined otherwiſe. But this ſeverity was mitigated by the ſtatute 1 Edw. III. c. 12. which ordained, that in ſuch caſe the lands ſhould not be forfeited, but a reaſonable fine be paid to the king. Upon which ſtatute it was ſettled, that one-third of the yearly value ſhould be paid for a licence of alienation; but, if the tenant preſumed to aliene without a licence, a full year's value ſhould be paid. Theſe fines were at laſt totally taken away by ſtatute 12 Car. II. c. 24. See *Knight-Service*.

Fine-Drawing, or *Rentering*, a dexterous ſewing up or rejoining the parts of any cloth, ſtuff, or the like, torn or rent in the dreſſing, wearing, &c.

It is prohibited to *fine draw* pieces of foreign manufacture upon thoſe of our own, as has formerly been practiſed. See Rentering.

Fine-Stiller, in the diſtillery. That branch of the art which is employed on the diſtilling the ſpirit from treacle or other preparations or recrements of ſugar, is called *fine-ſtilling*, by way of diſtinction from malt-ſtilling; and the perſon who exerciſes this part of the trade is called a *fine-ſtiller*.

The operation in procuring the ſpirit from ſugar is the ſame with that uſed in making the malt-ſpirit; a waſh of the ſaccharine matter being made with water from treacle, &c. and fermented with yeaſt. It is uſual to add in this caſe, however, a conſiderable portion of malt, and ſometimes powdered jalap, to the fermenting backs. The malt accelerates the fermentation, and makes the ſpirit come out the cheaper, and the jalap prevents the riſe of any muſty head on the ſurface of the fermenting liquor, ſo as to leave a greater opportunity for the free acceſs of the air, and thus to ſhorten the work, by turning the foamy into a hiſſing fermentation.

FINERS *of* Gold *and* Silver, are thoſe who purify and part thoſe metals from other coarſer ones by fire and acids. They are alſo called *parters* in old law-books, and ſometimes *departers*.

FINERY, in the iron-works, is one of the two forges at which they hammer the ſow or pig iron.

Into the finery they firſt put the pigs of iron, placing three or four of them together behind the fire, with a little of one end thruſt into it; where, ſoftening by degrees, they ſtir and work them with long bars of iron, and expoſe at different times different parts to the blaſt of the bellows, in order to refine it as equally as poſſible, till the metal runs together with a round maſs or lump, which they call a *half bloom*.—They then take this out, and give it a few ſtrokes with their ſledges; afterwards they carry it to a great heavy hammer, raiſed by the motion of a water-wheel; where, applying it dexterouſly to the blows, they preſently beat it out into a thick ſhort ſquare. This they put into the finery again, and heating it red-hot, they work it under the ſame hammer till it comes to be in the ſhape of a bar in the middle, but with two ſquare knobs at the ends, which they call an *ancony*. It is then carried into the other forge called the *chaffry*.

FINEERING. See Veneering.

FINESSE, a French term, of late current in Engliſh. Literally, it is of no farther import than our Engliſh *fineneſs*; but among us it is chiefly uſed to denote that peculiar delicacy or ſubtilty perceived in works of the mind, and the niceſt and moſt ſecrete and ſublime parts of any ſcience or art.

It is ſometimes uſed to expreſs that kind of ſubtilty made uſe of for the purpoſes of deception.

FINGAL, king of Morven, in ancient Caledonia. He flouriſhed in the third century; and according to the Iriſh hiſtories died in the year 283, although there is ſome reaſon from Oſſian's poems for placing his death a few years later. Fingal was deſcended in all probability from thoſe Celtic tribes who were the firſt inhabitants of Britain. Tradition, and the poems of

Oſſian, give him a long line of royal anceſtors, ſuch as Combal, Trenmor, Trathal, &c. who had all reigned over the ſame territory. Whether this territory was bounded by the Caledonian foreſt, or extended ſomewhat farther to the ſouth, towards the Roman province, is uncertain; but there is no doubt of its having extended over all the north and weſt Highlands, comprehending the Hebrides, whoſe petty chiefs were all ſubject to the king of Morven. His principal place of reſidence was Selma, which was probably in the neighbourhood of Glenco, ſuppoſed to be the Cona of Oſſian; though ſome imagine it to have been in Strath-Conan in Moray. The truth ſeems to be, that as Fingal and his people lived by hunting, they often ſhifted their habitation. Hence, in all parts of the Highlands we find, in the names of places, buildings, &c. ſuch monuments as juſtify their ſeveral claims for the honour of Fingal's reſidence. Fingal acquired great fame by his proweſs in arms. He made many ſucceſsful incurſions into the Roman province, from whence he carried away thoſe ſpoils which his ſon ſo often mentions under the names of the *wine of the ſtranger*, and the *wax of the ſtranger*. By ſea we find him frequently making voyages to Scandinavia, the Orkneys, and Ireland; called by Oſſian, *Lochlin*, *Inniſtore*, and *Ullin*. Several of theſe expeditions were celebrated by his ſon in epic poems, of which two only remain, Fingal and Temora. In the laſt of theſe poems, we find Fingal fighting together with his grandſon Oſcar. How long he lived afterwards is uncertain. He is ſaid to have died a natural death; and therefore none of his ſon's poems relate to this event, though it is occaſionally mentioned in many of them. "Did thy beauty laſt, O Ryno? Stood the ſtrength of car-borne Oſcar? Fingal himſelf paſſed away; and the halls of his fathers have forgot his ſteps. The blaſts of the north opens thy gates, O king, and I behold thee ſitting on miſt, dimly gleaming in all thine arms. Thy form now is not the terror of the valiant: but like a watery cloud, when we ſee the ſtars behind it, with their weeping eyes. Thy ſhield is like the aged moon; thy ſword vapour half kindled with fire. Dim and feeble is the chief who travelled in brightneſs before—But thy ſteps are on the winds of the deſart, and the ſtorms darken in thy hand. Thou takeſt the ſun in thy wrath, and hideſt him in thy clouds. The ſons of little men are afraid, and a thouſand ſhowers deſcend."—*Berrathon.*

"The character of Fingal (Dr Blair obſerves) is perhaps the moſt perfect that was ever drawn by a poet, for we may boldly defy all the writers of antiquity to ſhow us any hero equal to Fingal. Throughout the whole of Oſſian's works, he is preſented to us in all that variety of lights which give the full diſplay of a character. In him concur almoſt all the qualities that can ennoble human nature; that can either make us admire the hero, or love the man. He is not only unconquerable in war, but he makes his people happy by his wiſdom in the days of peace. He is truly the father of his people. He is known by the epithet of "Fingal of the mildeſt look," and diſtinguiſhed on every occaſion by humanity and generoſity. He is merciful to his foes, full of affection to his children, full of concern about his friends, and never mentions Agandecca, his firſt love, without the utmoſt tenderneſs. He is the univerſal protector of the diſtreſſed; none ever went ſad from Fingal.—'O Oſcar! bend the ſtrong in arms, but ſpare the feeble hand. Be thou a ſtream of many tides againſt the foes of thy people; but like the gale that moves the graſs to thoſe who aſk thine aid: ſo Trenmor lived; ſuch Trathal was; and ſuch has Fingal been. My arm was the ſupport of the injured; the weak reſted behind the lightning of my ſteel. Theſe were the maxims of true heroiſm, to which he formed his grandſon. His fame is repreſented as every where ſpread; the greateſt heroes acknowledge his ſuperiority; his enemies tremble at his name; and the higheſt encomiums that can be beſtowed on one whom the poet would moſt exalt is to ſay, That his ſoul was like the ſoul of Fingal. Wherever he appears, we behold the hero. The objects he purſues are always great; to bend the proud, to protect the injured, to defend his friends, to overcome his enemies by generoſity more than by force. Some ſtrokes of human imperfection and frailty are what uſually give us the moſt clear view and the moſt ſenſible impreſſion of a character, becauſe they preſent to us a man ſuch as we have ſeen; they recal known features of human nature. When poets go beyond this range, and attempt to deſcribe a faultleſs hero, they, for the moſt part, ſet before us a ſort of vague undiſtinguiſhable character, ſuch as the imagination cannot lay hold of, or realiſe to itſelf as the object of affection. But Fingal, though exhibited without any of the common human failings, is nevertheleſs a real man; a character which touches and intereſts every reader."

We may obſerve, that Fingal appears to have been no leſs a poet than a warrior; at leaſt in all thoſe paſſages aſcribed to him in the poems of his ſon, there is a grandeur and loftineſs that elevates them above the common ſtyle even of Oſſian. The following paſſage from the poem of *Carthon* may be taken as a ſpecimen of Fingal's poetry, 'Raiſe, ye bards,' ſaid the mighty Fingal, 'the praiſe of unhappy Moina. Call her ghoſt with your ſongs, to our hills; that ſhe may reſt with the fair of Morven, the ſunbeams of other days, and the delight of heroes of old. I have ſeen the walls of Balclutha, but they were deſolate. The fire had reſounded in the halls; and the voice of the people is heard no more. The ſtream of Clutha was removed from its place by the fall of the walls. The thiſtle ſhook, there, its lonely head: the moſs whiſtled to the wind. The fox looked out from the windows; the rank graſs of the wall waved round his head. Deſolate is the dwelling of Moina: ſilence is in the houſe of her fathers. Raiſe the ſong of mourning, O bards, over the land of ſtrangers. They have but fallen before us; for one day we muſt fall.—Why doſt thou build the hall, ſon of the winged days? Thou lookeſt from thy towers to-day; yet a few years, and the blaſt of the deſart comes; it howls in thy empty court, and whiſtles round thy half-worn ſhield.—And let the blaſt of the deſart come! We ſhall be renowned in our day. The mark of my arm ſhall be in the battle, and my name in the ſong of bards. Raiſe the ſong; ſend round the ſhell: and let joy be heard in my hall. When thou, ſun of heaven, ſhalt fail? if thou ſhalt fail, thou mighty light! if thy brightneſs is for a ſeaſon, like Fingal; our fame ſhall ſurvive thy beams.'—Such was the joy of Fingal in the day of his joy. His thouſand bards leaned forward from their ſeats, to hear the voice of their king. It was like the muſic of the harp on the gale of the ſpring. Lovely were thy thoughts, O Fingal! Why had not Oſſian the ſtrength of thy ſoul? But thou ſtandeſt alone, my father; and who can equal the king of Morven?"

FINGERS, in anatomy, the extreme part of the hand divided into five members. See ANATOMY, n° 56.

FINING *of* LIQUORS. See CLARIFICATION.

FINISTERRE, the moſt weſterly cape or promontory of Spain, in 10. 15. W. Long. and 43° N. Lat. This cape is likewiſe the moſt weſterly part of the continent of Europe.

FINITE, ſomething bounded or limited, in contradiſtinction to INFINITE.

FINLAND (the duchy of), is bounded on the weſt by the gulph of Bothnia, on the eaſt by Muſcovy, on the ſouth by the gulph of Finland and Ingria, and on the north by Bothnia and Lapland. It is about 200 miles in length, and almoſt as much in breadth. It contains many lakes; in which are ſeveral iſlands, which are generally rocks or inacceſſible mountains. The inhabitants are ſmall of ſtature, capable of enduring hardſhips, and good ſoldiers. The Ruſſians have for ſome time rendered themſelves maſters of a good part of this province; the reſt belongs to Sweden. It is divided into ſeven provinces: 1. Finland; 2. Cajana; 3. Thavaſthia; 4. Nyeland; 5. Savolaxia; 6. Carelia; and, 7. Kexholmia.

Finland Proper is an agreeable country, and lies over-againſt the city of Stockholm, near the place where the gulphs of Bothnia and Finland meet. It is divided into South and North Finland. It is diverſified with mountains, foreſts, lakes, meadows, and pleaſant fields. The inhabitants ſalt the fiſh they do not conſume themſelves, and ſend it into foreign countries.

FINNINGIA, or FENNINGIA, (anc. geog.), the true reading for *Eningia* in Pliny, which he makes an iſland, but is more truly a peninſula. Now FINLAND, a province of Sweden. *Fenni*, or *Finni*, the people; whoſe ferocity was extraordinary, poverty extreme, herbs their food, ſkins their covering, and the ground their couch: regardleſs of man and of gods, they attained to a very difficult thing, not to have a ſingle wiſh to form, (Tacitus).

FIR-TREE, in botany. See PINUS.

FIRE, in phyſiology, ſignifies that ſubtile inviſible cauſe by which bodies are expanded or enlarged in bulk, and become hot to the touch; fluids are rarefied into vapour; ſolid bodies become fluid, and in like manner are at laſt diſſipated, or if incapable of being carried off in vapour, are at length melted into glaſs. It ſeems likewiſe to be the chief agent in nature on which animal and vegetable life have an immediate dependence, and without which it does not appear that nature itſelf could ſubſiſt a ſingle moment.

The diſputes concerning fire, which for a long time divided philoſophers, have now in a great meaſure, though not wholly, ſubſided. The celebrated philoſophers of the laſt century, Bacon, Boyle, and Newton, were of opinion, that fire was no diſtinct ſubſtance from other bodies, but that it conſiſted entirely in the violent motion of the parts of any body. As no motion, however, can be produced without a cauſe, they were obliged to have recourſe to a mechanical force or impulſe as the ultimate cauſe of fire in all caſes. Thus Boyle tells us, that when a piece of iron becomes hot by hammering, "there is *nothing* to make it ſo, except the forcible motion of the hammer impreſſing a vehement and variouſly determined agitation on the ſmall parts of the iron." Bacon defines *heat*, which he makes ſynonymous with fire, to be "an expanſive undulatory motion in the minute particles of a body, whereby they tend with ſome rapidity from a centre towards a circumference, and at the ſame time a little upwards." Sir Iſaac Newton ſaid nothing poſitive upon the ſubject; but conjectured that groſs bodies and light might be convertible into one another; and that great bodies of the ſize of our earth when violently heated, might continue and increaſe their heat by the mutual action and reaction of their parts.

But while the mechanical philoſophers thus endeavoured to account for the phenomena of fire upon the ſame principles which they judged ſufficient to explain thoſe of the univerſe in general, the chemiſts as ſtrenuouſly aſſerted that fire was a fluid of a certain kind diſtinct from all others, and univerſally preſent throughout the whole globe. Boerhaave particularly maintained this doctrine; and in ſupport of it brought the following argument, that ſteel and flint would ſtrike fire, and produce the very ſame degree of heat in Nova-Zembla, which they would do under the equator. Other arguments were drawn from the increaſed weight of metalline calces, which they ſuppoſed to proceed from the fixing of the element of fire in the ſubſtance whoſe weight was thus increaſed. By theſe experiments, Mr Boyle himſelf ſeems to have been ſtaggered; as he publiſhed a treatiſe on the poſſibility of making fire and flame ponderable; though this was directly contrary to his own principles already quoted. For a long time, however, the matter was moſt violently diſputed; and the mechanical philoſophers, though there arguments were equally inconcluſive with thoſe of their adverſaries, at laſt prevailed through the prejudice in favour of Sir Iſaac Newton, who indeed had ſcarce taken any active part in the conteſt.

That the cauſe of fire cannot be any mechanical motion which we can impreſs, is very evident; becauſe on mechanical principles an effect muſt always be proportionable to the cauſe. In the caſe of fire, however, the effect is beyond all calculation greater than the cauſe, ſuppoſing the latter to be only a mechanical percuſſion, as in the caſe of hammering iron till it be red hot. By a few ſtrokes of an hammer, the particles of a piece of iron, we ſhall allow, may be ſet in a violent motion and thus produce fire. If, however, we direct the motion of theſe particles upon another body whoſe parts are at reſt, and in ſome degree coherent, it is plain that the latter will reſiſt and diminiſh the motion of the particles already moved, in proportion to their *vis inertiæ*, as well as the coheſion of the parts of the ſecond body, if indeed we can ſuppoſe the *vis inertiæ* of matter to be different from the effect of gravitation, coheſion, or ſome other power acting upon it. By no argumentation whatever, then, can we ſhow upon mechanical principles, why fire ſhould have ſuch a tendency to increaſe and multiply itſelf without end, as we ſee it has, even abſtracting from all conſideration of the neceſſity of air for continuing the action of fire.

The action of the air in augmenting and continuing the power of fire, ſeems ſcarce at all to have been conſidered by thoſe who firſt undertook an inveſtigation of the ſubject. It evidently gave riſe to the Hutchinſonian hypotheſis, that fire, light, and air, were convertible into one another. This, however, is equally untenible with the mechanical hypotheſis: for later diſcoveries have ſhown, that our atmoſphere is compoſed of two diſtinct fluids, only one of which is fit for ſupporting flame; and if we ſhould ſuppoſe this to be the only proper air, it is in like manner demonſtrated, that this pure fluid is not homogeneous, but compoſed of a gravitating and non-gravitating ſubſtance; the latter of which only has the properties of fire: ſo that this element is ſtill as inviſible as ever; nor can it be ſhown by any experiment that *fire per ſe* has ever been changed into a palpable or gravitating ſubſtance.

The experiments which firſt ſeemed to bring this diſpute to a deciſion were thoſe of Dr Black, concerning what he called *latent heat*; on which ſome other names, ſuch as *abſolute heat*, *ſpecific fire*, &c. have been beſtowed, very little to the advancement of ſcience in general. From theſe diſcoveries it appears, that fire may exiſt in bodies in ſuch a manner as not to diſcover itſelf in any other way than by its action upon the minute parts of the body; but that ſuddenly this action may be changed in ſuch a manner as no longer to be directed upon the particles of the body itſelf, but upon external objects: in which caſe we then perceive its action by our ſenſe of feeling, or diſcover it by the thermometer, and call it *ſenſible heat*. This expreſſion, it muſt be owned, is improper; and the uſe of the word *heat*, inſtead of *fire*, has produced ſome confuſion, which it is not now eaſy to avoid in ſpeaking on theſe ſubjects. By the word *heat*, we ought always to underſtand the effect of fire, or the fluid acting in a certain manner, rather than the mere element itſelf; which, it is certain, from the experiments juſt mentioned, may exiſt in ſubſtances actually *cold* to the touch.

From this diſcovery made by Dr Black, along with many others in electricity, and recorded at length in various articles of this work, it is now almoſt univerſally allowed, that fire is a diſtinct fluid capable of being transferred from one body to another. But when this was diſcovered, another queſtion no leſs perplexing occurred, viz. what kind of a fluid it was; or whether it bears any analogy to thoſe with which we are better acquainted? Here we find two fluids, viz. the ſolar light, and the electric matter, both of which occaſionally act as fire, and which therefore ſeem likely to be all the ſame at bottom. By the vulgar, indeed, the matter has long ago been determined; and the rays of the ſun as well as the electrical fluid have been promiſcuouſly denominated *elementary fire*. Philoſophers, indeed, have with-held their aſſent; though their reaſons for ſo doing are by no means apparent. The moſt ſtrange ſuppoſitions, however, have been made concerning the nature of both thoſe fluids, and on the moſt ſlender grounds imaginable; or rather, on no grounds at all, they have been ſuppoſed to be phlogiſton itſelf, or to contain a large proportion of it. Mr Scheele went ſo far in this way as to form an hypotheſis, which he endeavoured to ſupport by ſome experiments, that fire is compoſed of dephlogiſticated air and phlogiſton. But it is now aſcertained beyond all poſſibility of diſpute, that the reſult of ſuch a combination is not fire, but fixed air: ſo that we need not take any further notice of this hypotheſis than juſt to obſerve, that it would have been altogether untenible, even though this diſcovery had not been made; becauſe the dephlogiſticated air itſelf is not a ſimple but a compound ſubſtance, as has already been obſerved; and that in all caſes of combuſtion, the one part of the air is ſeparated from the other.

It was long ago obſerved by Sir Iſaac Newton, that heat was certainly conveyed by a medium more ſubtle than the common air; becauſe two thermometers, one included in the vaccum of an air-pump, the other placed in the open air, at an equal diſtance from the fire, would grow equally hot in nearly the ſame time. The conſequence of this, had he purſued the thought, was, that fire itſelf was equally preſent in all places, and as active where there was no terreſtrial matter as where there was. New improvements in the air-pump have enabled ſucceeding philoſophers to make more perfect vacuums, ſuch as it has been ſuppoſed even the electric matter cannot paſs through. It is not to be doubted, however, that, even there, the thermometer would be heated by a fire as well as in the open air. Fire, therefore, exiſts and acts where there is no other matter, and of conſequence is a fluid *per ſe*, independent of every terreſtrial ſubſtance, without being generated or compounded of any thing we are yet acquainted with. To determine the nature of the fluid, we have only to conſider whether any other can be diſcovered which will paſs through the perfect vacuum juſt mentioned, and act there as fire. Such a fluid we find in the ſolar light, which is well known to act even *in vacuo* as the moſt violent fire. The ſolar light will likewiſe act in the very ſame manner in the moſt intenſe cold; for M. de Sauſſure has found, that on the cold mountain top the ſun-beams are equally, nay more powerful, than on the plain below. It appears, therefore, that the ſolar light will produce heat independent of any other ſubſtance whatever; that is, where no other body is preſent, at leaſt as far as we can judge, except the light itſelf, and the body to be acted upon. We cannot therefore avoid concluding, that a certain modification of the light of the ſun is the cauſe which produces heat, expanſion, vapour, &c. and anſwers to the reſt of the characters given in our definition of fire, and that independent of any other ſubſtance whatever.

Under the article Electricity, ſect. vi. we have endeavoured to ſhow that the electric matter is no other than the light of the ſun abſorbed by the earth, and thus becoming ſubject to new laws, and aſſuming many properties apparently different from what it has when it acts as light. Even in this caſe it manifeſts its identity with fire or light, *viz.* by producing a moſt intenſe heat where a large quantity of it paſſes through a ſmall ſpace. *In vacuo*, indeed, we cannot manage it in ſuch a manner as to make the proof deciſive. But though this muſt be counted a defect, it never can amount to any poſitive proof that electricity and fire are different. We ſee that in ſome caſes they produce the very ſame effects; and if they do not ſo in all, we ought rather to account for the difference from the variation of circumſtances, and our want of knowledge or abilities

ties to make proper experiments, than to multiply elements without any neceſſity, when one is evidently capable of anſwering all the purpoſes of nature. At any rate, the experiments which have already been made, and the proofs adduced from the phenomena of nature, ſhow ſuch a ſtrong affinity between the elements of fire, light, and electricity, that we may not only aſſert their identity upon the moſt probable grounds, but lay it down as a poſition againſt which no argument of any weight has an exiſtence at preſent. For a further diſcuſſion of this ſubject, ſee CHEMISTRY, Part I. Sect i. ELECTRICITY, Sect. vi. HEAT, FLAME, FLUIDITY, &c.

Wild FIRE, a kind of artificial or factitious fire, which burns even under water, and that with greater violence than out of it.

It is compoſed of ſulphur, naphtha, pitch, gum, and bitumen; and is only extinguiſhable by vinegar mixed with ſand and urine, or by raw hides.

Its motion or tendency is ſaid to be contrary to that of natural fire, and always follows the direction in which it is thrown; whether it be downwards, ſidewiſe, or otherwiſe. The French call it *Greek fire*, or *feu Gregeois*, becauſe firſt uſed by the Greeks, about the year 660; as is obſerved by the Jeſuit Petavius, on the authority of Nicetas, Theophanes, Cedrenus, &c.

The inventor, according to the ſame Jeſuit, was an engineer of Heliopolis, in Syria, named *Callinicus*, who firſt applied it in the ſea-fight commanded by Conſtantine Pogonates againſt the Saracens, near Cyzicus, in the Heleſpont; and with ſuch effect, that he burnt the whole fleet therewith, wherein were 30,000 men. But others will have it of a much older date; and hold Marcus Gracchus the inventor: which opinion is ſupported by ſeveral paſſages both in the Greek and Roman writers, which ſhows it to have been anciently uſed by both theſe nations in their wars.

Conſtantine's ſucceſſors uſed it on divers occaſions with equal advantage as himſelf; and what is remarkable enough is, that they were ſo happy as to keep the ſecret of the compoſition to themſelves, ſo that no other nation knew it in the year 960.

Hugh king of Burgundy, demanding ſhips of the emperor Leo, for the ſiege of Freſne, deſired likewiſe the Greek fire.

F. Daniel gives us a good deſcription of the Greek fire in his account of the ſiege of Damietta under St Louis. Every body, ſays that author, was aſtoniſhed with the Greek fire, which the Turks then prepared; and the ſecret whereof is now loſt. They threw it out of a kind of mortar; and ſometimes ſhot it with an odd ſort of croſs-bow, which was ſtrongly bent by means of a handle or winch, of much greater force than the mere arm. That thrown with the mortar ſometimes appeared in the air of the ſize of a tun, with a long tail, and a noiſe like that of thunder. The French by degrees got the ſecret of extinguiſhing it; in which they ſucceeded ſeveral times.

Ann. Reg. xviii. 117.

Machine for Preſerving from FIRE. This machine conſiſts of a pole, a rope, and a baſket. The pole is of fir, or a common ſcaffold pole, of any convenient length from 36 to 46 feet; the diameter at bottom, or greateſt end, about five inches; and at the top, or ſmalleſt end, about three inches. At three feet from the top is a mortiſe through the pole, and a pully fixed to it of nearly the ſame diameter with the pole in that part. The rope is about three quarters of an inch diameter, and twice the length of the pole, with a ſpring hook at one end, to paſs through the ring in the handle of the baſket when uſed; it is put through the mortiſe over the pulley, and then drawn tight on each ſide to near the bottom of the pole, and made faſt there till wanted. The baſket ſhould be of ſtrong wicker-work, three feet and an half long, two feet and an half wide, rounded off at the corners, and four feet deep, rounding every way at the bottom. To the top of the baſket is fixed a ſtrong iron curve or handle with an eye or ring in the middle; and to one ſide of the baſket, near the top, is fixed a ſmall cord, or guide-rope, of about the length of the pole. When the pole is raiſed, and ſet againſt a houſe over the window from which any perſons are to eſcape, the manner of uſing it is ſo plain and obvious, that it needs not be deſcribed. The moſt convenient diſtance from the houſe for the foot of the pole to ſtand, where practicable, is about 12 or 14 feet. If two ſtrong iron ſtraps, about three feet long, rivetted to a bar croſs, and ſpreading about 14 inches at the foot, were fixed at the bottom of the pole, this would prevent its turning round or ſlipping on the pavement. And if a ſtrong iron hoop, or ferule, rivetted (or welded), to a ſemicircular piece of iron ſpreading about 12 inches, and pointed at the ends, were fixed on at the top of the pole, it would prevent its ſliding againſt the wall.

When theſe two laſt mentioned irons are fixed on, they give the pole all the ſteadineſs of a ladder; and becauſe it is not eaſy, except to perſons who have been uſed to it, to raiſe and ſet upright a pole of 40 feet or more in length, it will be convenient to have two ſmall poles or ſpars of about two inches diameter, fixed to the ſides of the great pole at about two or three feet above the middle of it, by iron eyes rivetted to two plates, ſo as to turn every way; the lower end of theſe ſpars to reach within a foot of the bottom of the great pole, and to have ferules and ſhort ſpikes to prevent ſliding on the pavement, when uſed occaſionally to ſupport the great pole like a tripod. There ſhould be two ſtrong aſh trundles let through the pole, one at four feet and one at five feet from the bottom, to ſtand out about eight inches on each ſide, and to ſerve as handles, or to twiſt the rope round in lowering a very heavy weight. If a block and pulley were fixed at about the middle of the rope, above the other pulley, and the other part of the rope made to run double, it would diminiſh any weight in the baſket nearly one-half, and be very uſeful in drawing any perſon up, to the aſſiſtance of thoſe in the chambers, or for removing any effects out of a chamber, which it might be dangerous to attempt by the ſtairs.

It has been proved, by repeated trials, that ſuch a pole as we have been ſpeaking of can be raiſed from the ground, and two or three perſons taken out of the upper windows of an houſe, and ſet down ſafely in the ſtreet, in the ſpace of 35 ſeconds, or a little more than half a minute. Sick and infirm perſons, women, children, and many others, who cannot make uſe of a ladder, may be ſafely and eaſily brought down from any of the windows of an houſe on fire by this machine, and, by putting a ſhort pole through the handles of the baſket, may be removed to any diſtance without being taken out of the baſket. The pole muſt always have the rope ready fixed to it, and may be conveniently laid up upon two or three iron hooks under any ſhade or gate-way, and the baſket ſhould be kept at the watch-houſe. When the pole is laid up, the two ſpars ſhould always be turned towards the head of it. The baſket ſhould be made of peeled rods, and the pole and ſpars painted of a light ſtone-colour, to render it more viſible when uſed in the night.

Machines for extinguiſhing Fire. In the year 1734, the ſtate of Sweden offered a premium of 20,000 crowns for the beſt method of ſtopping the progreſs of accidental fires; when one Mr Fuches, a German phyſician, made a preparation for that end, and the experiment was made on a houſe built on purpoſe, of dry fir, at Legard iſland. In the building were placed ſeveral tubs of tar and pitch, and a great quantity of chips, all which were ſet on fire; flames iſſuing through the top of the houſe, windows, &c. when he threw in one of the barrels containing the preparation, which immediately quenched the flames; a ſecond barrel entirely cleared the ſmoke away; and the whole was executed to the ſatisfaction of the ſpectators, and to the no ſmall ſatisfaction of the inventor, who was about to return home, when unexpectedly the flames broke out again, ſuppoſed to be occaſioned by a ſmall quantity of combuſtible matter being introduced and ſet on fire ſecretly by ſome malicious perſon. Upon this the wrong-headed mob fell upon Mr Fuches, and beat him moſt unmercifully, ſo that he narrowly eſcaped with his life. He ſoon after left the country, and never could be prevailed on (though ſtrongly perſuaded by ſome of the moſt eminent citizens) to return. It is ſaid, another experiment of the ſame kind was tried in the year 1761 in Holland; but rendered abortive through the perverſeneſs of the populace.

Attempts of a ſimilar nature have met with a better reception in England. Of theſe the moſt ſucceſsful was that of Mr Godfrey, whoſe contrivance is thus deſcribed by Mr Ambroſe Godfrey, grandſon to the inventor. “The machine to be employed conſiſts of a ſmall portion of gunpowder cloſely confined; which, when animated by fire, acts by its elaſtic force upon a proper medium, and not only divideth it into the minuteſt atoms, but diſperſeth it alſo in every direction, ſo as immediately to extinguiſh any fire within a certain diſtance. This medium is a liquor ſtrongly impregnated with a preparation of antiphlogiſtic principles, which by their action upon burning materials extinguiſh the flames, and reduce them in general to the ſtate of a black coal; and, by its oppoſite nature to fire, hinders the remaining ſparks, notwithſtanding the admiſſion of the air, from kindling the flames afreſh. By this means, the great point is obtained, in giving ſufficient time for totally extinguiſhing any remains of fire.

“They who preſume that water only will perform this will find themſelves greatly miſtaken, as the draught of air will certainly rekindle the neighbouring materials, which are very fit to receive a freſh flame, the fire not being extinguiſhed by the quantity of water, but rather by the expanſion and rarefaction of its particles. There are ſeveral ſizes of theſe machines, from five to fifty pounds weight, in a portable and rather ſmall compaſs, and may generally be carried to any place where a man can go himſelf.

“But though theſe machines will prevent great fires by a timely application, they will not extinguiſh them after they had reached a frightful height, and ſeveral houſes, perhaps near a whole ſtreet, are in flames. The floors muſt be ſtanding, and acceſs to the building ſafe, otherwiſe no perſon can be ſuppoſed to approach near enough to apply them in a proper manner. Every fire has its beginning for the moſt part in ſome apartment; and, as ſoon as diſcovered, the family, inſtead of loſing all preſence of mind, ſhould immediately apply one or more of theſe machines, which will then fully anſwer the intention. The proper time of applying them, ſuppoſes that they are ready at hand. It will be in vain to think of fetching them from any conſiderable diſtance, as it will then be too late for them to perform any important ſervice; except indeed being the probable means of ſaving ſome adjacent houſe, by extinguiſhing the flames as often as they break out, till the building firſt on fire is totally conſumed, and, by falling into ruins, leaves the other in perfect ſafety.”

On the 19th of May 1761, at noon, Mr Godfrey's experiment for extinguiſhing fire, was tried in an houſe erected for that purpoſe, near Mary-le-bon. Their royal highneſſes the duke of York, prince William Henry, prince Henry Frederic, a great number of perſons of rank and diſtinction, and many of the learned world gave their attendance on this ſingular occaſion. The houſe, which is of brick, conſiſts of three rooms one above another, a ſtair-caſe, chimney, lath-and-plaſter ceilings, and a kind of wainſcotting round the rooms, of rough deal. Exactly at 12 o'clock the ground room, and that up one pair of ſtairs, were ſet on fire, by lighting the faggots and ſhavings laid in there for that purpoſe: in about 15 minutes the wainſcot of the under room was thought to be ſufficiently in flames, and three of the machines were thrown in; which, by almoſt immediate and ſudden exploſions, inſtantaneouſly extinguiſhed the flames, and the very ſmoke in that apartment in a few minutes totally diſappeared. By this time, the firemen, &c. who had the care of throwing in the machines, gave an alarm that the ſtair caſe had taken fire, and that it was neceſſary directly to go to work upon the next room; which was accordingly done, and with the ſame effect. The experiment, however, hitherto did not univerſally ſatisfy: in the laſt inſtance eſpecially it was thought to be too haſtily put in execution; and the populace without-ſide the paling, who were ſuppoſed to amount to near 20,000, and whoſe curioſity, from the very nature of their ſituation, remained much diſſatisfied, began to grow rather riotous, and talked of a ſecond bottle conjuror. For the ſake of the experiment, therefore, and to remove all manner of doubt, Mr Godfrey conſented to a third experiment in the upper room, which was entirely of wood. The flames were now ſuffered to get to a conſiderable height, and even the window frames deſtroyed, before the machines were thrown in: which, however, anſwered exactly as the former had done; and, being quite in ſight of the out-ſtanders, met with univerſal approbation.

Theſe machines of Mr Godfrey's, it is evident, would be of great uſe in extinguiſhing fires on ſhipboard; and might be conſidered as a no leſs neceſſary part of a ſhip's lading, than her ſtores or ammunition.

The hint of theſe machines is ſaid to have been taken by Dr Godfrey from the invention of one Zachary

Greyl, who exhibited machines ſimilar to thoſe of Dr Godfrey, before perſons of the firſt rank, but without meeting with any encouragement. His machines were made of wood, and the liquor employed was only water and conſequently inferior to Dr Godfrey's in its power of extinguiſhing fire. The latter is ſaid to have mixed his water with a certain quantity of oil of vitriol, or with ſal ammoniac. Theſe machines, however, as already obſerved, are found to be only ſerviceable in the beginning of a fire. When the roof had fallen in, they had no effect.

Water-Engine for Extinguiſhing FIRE. See HYDROSTATICS, n° 33.

In uſing this machine we have the following improvement by Dr Hoffman, which promiſes to be of great efficacy. As ſoon as the engine is in readineſs to work, ſtir into the water that immediately is to be diſcharged, ſeven or eight pounds of pearl-aſhes in powder, and continue to add it in this manner as occaſion requires; taking care that it be directed againſt the timber or wainſcot, &c. juſt beginning to burn, and not waſted againſt the brickwork: or, where time will admit, diſſolve any quantity of pearl-aſhes in a copper with water, and as faſt as it diſſolves, which will be in a few minutes, mix a pail full with the water in the engine, pretty often; and whatever burning wood it is played upon, will be extinguiſhed as if it was dipped in water, and will not burn afreſh in the part extinguiſhed.

Eaſy Method of Extinguiſhing FIRE *in Chimneys.* It is well known, that the inner parts of chimneys eaſily take fire; the ſoot that kindles therein emits a greater flame, according as the tunnel is more elevated, becauſe the inferior air feeds the fire. If this air could therefore be ſuppreſſed, the fire would ſoon be extinguiſhed. In order to this, ſome diſcharge a piſtol into the chimey, which produces no effect: others lay under the chimney a copper full of water; but the vapours that riſe from it, far from extinguiſhing the fire, ſeem to give it new force. Water thrown into the chimney at top is equally of no effect, becauſe it comes down through the middle of the tunnel, and not along the ſides. It would be more adviſable to ſtop with dung the upper orifices of the tunnel, for quenching the fire. But the ſureſt and readieſt method is, to take a little gunpowder, and having humected it with ſpittle for binding it, to form it into ſmall maſſes, and ſo throw it in the heart of the chimney. When it is burnt, and has produced a conſiderable vapour, a ſecond, afterwards a third, are thrown, and ſo on, as much as is neceſſary. In a little time the fire is extinguiſhed, and, as it were, choaked by this vapour; and cakes of inflamed ſoot are ſeen to fall from the tunnel, till at laſt not the leaſt veſtige of fire appears.

Securing Buildings againſt FIRE. Dr Hales propoſes to check the progreſs of fires by covering the floors of the adjoining houſes with earth. The propoſal is founded on an experiment which he made with a firboard half an inch thick, part of which he covered with an inch depth of damp garden mould, and then lighted a fire on the ſurface of the mould; though the fire was kept up by blowing, it was two hours before the board was burnt through, and the earth prevented it from flaming. The thicker the earth is laid on the floors, the better: however, Dr Hales apprehends that the depth of an inch will generally be ſufficient; and he recommends to lay a deeper covering on the ſtairs, becauſe the fire commonly aſcends by them with the greateſt velocity.

M. Hartley made ſeveral trials in the years 1775 and 1776, in order to evince the efficacy of a method which he had invented for reſtraining the ſpread of fire in buildings. For this purpoſe thin iron plates are well nailed to the tops of the joiſts, &c. the edges of the ſides and ends being lapped over, folded together, and hammered cloſe. Partitions, ſtairs, and floors, may be defended in the ſame manner; and plates applied to one ſide have been found ſufficient. The plates are ſo thin as not to prevent the floor from being nailed on the joiſts, in the ſame manner as if this preventative were not uſed; they are kept from ruſt by being painted or varniſhed with oil and turpentine. The expence of this addition, when extending through a whole building is eſtimated at about 5 *per cent.* Mr Hartley has a patent for this invention, and parliament has voted a ſum of money towards defraying the expence of his numerous experiments. The ſame preſervative may alſo be applied to ſhips, furnitre, &c.

Lord Mahon has alſo diſcovered and publiſhed a very ſimple and effectual method of ſecuring every kind of building againſt all danger of fire. This method he has divided into three parts, viz. under-flooring, extra-lathing, and inter-ſecuring.

The method of under-flooring is either ſingle or double. In ſingle under-flooring, a common ſtrong lath of oak or fir, about one-fourth of an inch thick, ſhould be nailed againſt each ſide of every joiſt, and of every main timber, ſupporting the floor which is to be ſecured. Other ſimilar laths are then to be nailed along the whole length of the joiſts, with their ends butting againſt each other. The top of each of theſe laths or fillets ough to be at 1½ inch below the top of the joiſts or timbers againſt which they are nailed; and they will thus form a ſort of ſmall ledge on each ſide of all the joiſts. Theſe fillets are to be well bedded in a rough plaſter hereafter mentioned, when they are nailed on, ſo that there may be no interval between them and the joiſts; and the ſame plaſter ought to be ſpread with a trowel upon the tops of all the fillets, and along the ſides of that part of the joiſts which is between the top of the fillets and the upper edge of the joiſts. In order to fill up the intervals between the joiſts that ſupport the floor, ſhort pieces of common laths, whoſe length is equal to the width of theſe intervals, ſhould be laid in the contrary direction to the joiſts, and cloſe together in a row, ſo as to touch one another: their ends muſt reſt upon the fillets, and they ought to be well bedded in the rough plaſter, but are not to be faſtened with nails. They muſt then be covered with one thick coat of the rough plaſter, which is to be ſpread over them to the level of the tops of the joiſts: and in a day or two this plaſter ſhould be trowelled over cloſe to the ſides of the joiſts, without covering the tops of the joiſts with it.

In the method of double-flooring, the fillets and ſhort pieces of laths are applied in the manner already deſcribed; but the coat of rough plaſter ought to be little more than half as thick as that in the former method. Whilſt this rough plaſter is laid on, ſome more of the ſhort pieces of laths abovementioned muſt be laid in the intervals between the joiſts upon the firſt coat, and be dipped deep in it. They ſhould be laid as cloſe as poſſible to each other, and in the ſame direction with the firſt layer of ſhort laths. Over this ſecond layer of ſhort laths there muſt be ſpread another coat of rough plaſter, which ſhould be trowelled level with the tops of the joiſts without riſing above them. The rough plaſter may be made of coarſe lime and hair; or, inſtead of hair, hay chopped to about three inches in length may be ſubſtituted with advantage. One meaſure of common rough ſand, two meaſures of ſlacked lime, and three meaſures of chopped hay, will form in general a very good proportion, when ſufficiently beat up together in the manner of common mortar. The hay ſhould be put in after the two other ingredients are well beat up together with water. This plaſter ſhould be made ſtiff; and when the flooring boards are required to be laid down very ſoon, a fourth or fifth part of quicklime in powder, formed by dropping a ſmall quantity of water on the limeſtone a little while before it is uſed, and well mixed with this rough plaſter, will cauſe it to dry very faſt. If any cracks appear in the rough plaſter-work near the joiſts when it is thoroughly dry, they ought to be cloſed by waſhing them over with a bruſh wet with mortar-waſh: this waſh may be prepared by putting two meaſures of quicklime and one of common ſand in a pail, and ſtirring the mixture with water till the water becomes of the conſiſtence of a thin jelly.

Before the flooring boards are laid, a ſmall quantity of very dry common ſand ſhould be ſtrewed over the plaſter-work, and ſtruck ſmooth with an hollow rule, moved in the direction of the joiſts, ſo that it may lie rounding between each pair of joiſts. The plaſter-work and ſand ſhould be perfectly dry before the boards are laid, for fear of the dry rot. The method of under-flooring may be ſucceſsfully applied to a wooden ſtair-caſe; but no ſand is to be laid upon the rough plaſter-work. The method of extra-lathing may be applied to ceiling joiſts, to ſloping roofs, and to wooden partitions.

The third method, which is that of inter-ſecuring, is very ſimilar to that of under-flooring; but no ſand is afterwards to be laid upon it. Inter-ſecuring is applicable to the ſame parts of a building as the method of extra-lathing, but it is ſeldom neceſſary.

Lord Mahon has made ſeveral experiments in order to demonſtrate the efficacy of theſe methods. In moſt houſes it is only neceſſary to ſecure the floors; and the extra-expence of under-flooring, including all materials, is only about nine pence per ſquare yard, and with the uſe of quicklime a little more. The extra-expence of extra-lathing is no more than ſix pence per ſquare yard for the timber ſide walls and partitions; but for the ceiling about nine pence per ſquare yard. But in moſt houſes no extra-lathing is neceſſary.

Fire-Eater. We have a great number of mountebanks who have procured the attention and wonder of the public by eating of fire, walking on fire, waſhing their hands in melted lead, and the like tricks.

The moſt celebrated of theſe was the famous Richardſon, much talked of abroad. His ſecret, as related in the *Journal des Sçavans*, of the year 1680, conſiſted in a pure ſpirit of ſulphur, wherewith he rubbed his hands, and the parts that were to touch the fire; which burning and cauteriſing the epidermis, hardened and enabled the ſkin to reſiſt the fire.

Indeed, this is no new thing: Amb. Paré aſſures us he had tried it on himſelf; that after waſhing the hands in urine, and with unguentum aureum, one may ſafely waſh them in melted lead.

He adds alſo that by waſhing his hands in the juice of onions, he could bear a hot ſhovel on them while it melted lead.

Fire, in theology. See Hell.

We read of the ſacred fire in the firſt temple of Jeruſalem, which came down from heaven: it was kept with the utmoſt care, and they were forbidden to carry any ſtrange fire into the temple. This fire is one of the five things which the Jews confeſs were wanting in the ſecond temple.

The pagans had their ſacred fires, which they kept in their temples with the moſt religious care, and which were never to be extinguiſhed. Numa was the firſt who built a temple to Fire as a goddeſs, at Rome, and inſtituted an order of prieſteſſes for the preſervation of it. See Vestals.

Fire was the ſupreme god of the Chaldeans; the Magi were worſhippers of fire; and the Greeks and Armenians ſtill keep up a ceremony called the *holy fire*, upon a perſuaſion that every Eaſter-day a miraculous fire deſcends from heaven into the holy ſepulchre, and kindles all the lamps and candles there.

Fire kindled ſpontaneouſly in the Human Body. See *Extraordinary Caſes of* Burning.

Fire-Barrel. See Fire-*Ship*, Note (b).

Fire-Bavins. Ibid. Note (d).

Fire-Arrow, in naval artillery, is a ſmall iron dart furniſhed with ſprings and bars, together with a match impregnated with ſulphur and powder, which is wound about its ſhaft. It is intended to fire the ſails of the enemy, and is for this purpoſe diſcharged from a muſquetoon or ſwivel-gun. The match being kindled by the exploſion, communicates the flame to the ſail againſt which it is directed, where the arrow is faſtened by means of its bars and ſprings. This weapon is peculiar to hot climates, particularly the Weſt Indies, where the ſails being extremely dry by reaſon of the great heats, they inſtantly take fire, and of courſe ſet fire to the maſts and riging, and laſtly to the veſſel itſelf.

Fire-Ball, in artillery, a compoſition of meal-powder, ſulphur, ſalt-petre, pitch, &c. about the bigneſs of a hand-grenade, coated over with flax, and primed with the ſlow compoſition of a fuze. This is to be thrown into the enemy's works in the night time, to diſcover where they are; or to fire houſes, galleries, or blinds of the beſiegers; but they are then armed with ſpikes or hooks of iron, that they may not roll off, but ſtick or hang where they are deſired to have any effect. See *Fire*-Balls, and *Light* Balls.

Balls of Fire, in meteorology, a kind of luminous bodies generally appearing at a great height above the earth, with a ſplendor ſurpaſſing that of the moon; and ſometimes equalling her apparent ſize. They generally proceed in this hemſphere from north to ſouth with vaſt velocity, frequently breaking into ſeveral ſmaller ones, ſometimes vaniſhing with a report, ſometimes not.

Theſe luminous appearances no doubt conſtitute one part of the ancient prodigies, blazing ſtars or comets, which laſt they ſometimes reſemble in being attended with a train; but frequently they appear with a round and well defined diſk. The firſt of theſe of which we have any accurate account, was obſerved by Dr Halley and ſome other philoſophers at different places, in the year 1719. From the ſlight obſervations they could take of its courſe among the ſtars, the perpendicular height of this body was computed at about 70 miles from the ſurface of the earth. The height of others has alſo been computed and found to be various; though in general it is ſuppoſed to be beyond the limits aſſigned to our atmoſphere, or where it loſes its refractive power. The moſt remarkable of theſe on record appeared on the 18th of Auguſt 1783, about nine o'clock in the evening. It was ſeen to the northward of Shetland, and took a ſoutherly direction for an immenſe ſpace, being obſerved as far as the ſouthern provinces of France, and one account ſays that it was ſeen at Rome alſo. During its courſe it appears frequently to have changed its ſhape; ſometimes appearing in the form of one ball, ſometimes of two or more; ſometimes with a train, ſometimes without one. It paſſed over Edinburgh nearly in the zenith, and had then the appearance of a well defined round body, extremely luminous and of a greeniſh colour; the light which it diffuſed on the ground giving likewiſe a greeniſh caſt to objects. After paſſing the zenith it was attended by a train of conſiderable length, which continually augmenting, at laſt obliterated the head entirely; ſo that it looked like a wedge, flying with the obtuſe end foremoſt. The motion was not apparently ſwift, by reaſon of its great height; though in reality it muſt have moved with great rapidity on account of the vaſt ſpace it travelled over in a ſhort time. In other places its appearance was very different. At Greenwich we are told, that "two bright balls parallel to each other led the way, the diameter of which appeared to be about two feet; and were followed by an expulſion of eight others, not elliptical, ſeeming gradually to mutilate, for the laſt was ſmall. Between each two balls a luminous ſerrated body extended, and at the laſt a blaze iſſued which terminated in a point. Minute particles dilated from the whole. The balls were tinted firſt by a pure bright light, then followed a tender yellow, mixed with azure, red, green, &c.; which, with a coalition of bolder tints and a reflection from the other balls, gave the moſt beautiful rotundity and variation of colours that the human eye could be charmed with. The ſudden illumination of the atmoſphere, and the form and ſingular tranſition of this bright luminary, tended much to make it awful: nevertheleſs the amazing vivid appearance of the different balls, and other rich connective parts not very eaſy to delineate, gave an effect equal to the rainbow in the full zenith of its glory."

Dr Blagden, in a paper on this ſubject in the 74th volume of the Philoſophical Tranſactions, has not only given a particular account of this and other meteors of the kind, but added ſeveral conjectures relating to the probable cauſes of them. The firſt thing which occurred to philoſophers on this ſubject was, that the meteors in queſtion were burning bodies riſing from the ſurface of the earth, and flying along the atmoſphere with great rapidity. But this hypotheſis was ſoon abandoned, on conſidering that there was no power known by which ſuch bodies could either be raiſed to a ſufficient height, or projected with the velocity of the meteors. The next hypotheſis was, that they do not conſiſt of one ſingle body, but of a train of ſulphureous vapours, extending a vaſt way through the atmoſphere, and being kindled at one end, diſplay the luminous appearances in queſtion by the fire running from one end of the train to the other. To this hypotheſis, which was invented by Dr Halley, Dr Blagden objects that no juſt explanation is given of the nature of the vapours themſelves, the manner in which they are raiſed up, or in which they can be regularly arranged in ſtraight lines of ſuch vaſt extent; or how they can be ſuppoſed to burn in ſuch rarefied air. "Indeed, (ſays he) it is very difficult to conceive how vapours could be prevented, in thoſe regions where there is in a manner no preſſure, from ſpreading out on all ſides in conſequence of their natural elaſticity, and inſtantly loſing that degree of denſity which ſeems neceſſary for inflammation. Beſides, it is to be expected, that ſuch trains would ſometimes take fire in the middle, and thus preſent the phenomenon of two meteors at the ſame time, receding from one another in a direct line."

For theſe and other reaſons this hypotheſis of Dr Halley was abandoned, and another ſubſtituted in its place. This was, that the meteors we ſpeak of are permanent ſolid bodies, not riſing from the earth, but revolving round it in very eccentric orbits, and thus in their perigeon moving with inconceivable rapidity. But the Doctor ſhows, that even on this ſuppoſition, the velocity of ſuch bodies muſt ſcarce be one third of that with which fire-balls move, and which has been calculated at upwards of 1000 miles per minute. The hypotheſis is likewiſe liable to a number of other objections which cannot be anſwered, particularly from the variations in their appearance; for it is impoſſible to ſhow in what manner one ſolid and permanent body could aſſume the appearance of eight or ten, as was the caſe with the meteor of 1783; nor can it be ſhown why a body, which in paſſing over Edinburgh appeared with a diſk evidently leſs than that of the ſun, ſhould in paſſing over Greenwich, aſſume the appearance of *two* bodies, each of which had a diſk conſiderably larger than the apparent diſk of that luminary. To obviate, in ſome meaſure, objections of this kind, it has been ſuppoſed that the revolving bodies are ſurrounded by a kind of electrical atmoſphere by which they are rendered luminous; but (ſays the Doctor) I think, whoever carefully peruſes the various accounts of fire-balls, and eſpecially ours of the 18th of Auguſt, when it divided, will perceive that their phenomena do not correſpond with the idea of a ſolid nucleus involved in a ſubtle fluid, any more than with the idea of another learned gentleman, that they become luminous by means of a contained fluid, which occaſionally explodes through the thick ſolid outer ſhell."

Another hypotheſis, which Dr Blagden has not mentioned, is, that the meteors in queſtion are a kind of bodies which take fire as ſoon as they come within the atmoſphere of the earth. But this cannot be ſuppoſed without implying a previous knowledge of theſe bodies, which it is altogether impoſſible we can have. The only opportunity we have of ſeeing them is when they are on fire. Before that time they are in an inviſible and unknown ſtate; and it is ſurely improper to argue concerning them in this ſtate, or pretend to determine any one of their properties, when we have it not in our power to ſee or inveſtigate them in the leaſt. As the meteors therefore never manifeſt themſelves to our ſenſes but when they are on fire, the only rational concluſion we can draw from thence, is, that they have no exiſtence in any other ſtate; and conſequently that their ſubſtance muſt be compoſed of that fluid which, when acting after a certain manner, becomes luminous and ſhows itſelf as fire; remaining inviſible and eluding our reſearches in every other caſe. On this hypotheſis we muſt conclude that the fire-balls are great bodies of electric matter, moving from one part of the heavens where, to our conception, it is ſuperabundant, to another where it is deficient. This opinion is adopted by Dr Blagden for the following reaſons:

1. On account of their prodigious velocity, which is not leſs than 1200 miles in a minute, and ſeems incompatible with any other ſubſtance we know beſides the electric fluid. "This (ſays he) is perhaps the only caſe in which the courſe or direction of that fluid is rendered perceptible to our ſenſes, in conſequence of the large ſcale on which theſe meteors move."

2. Various electrical phenomena have been obſerved to attend them, ſuch as lambent fires ſettling upon men, horſes, &c. and ſparks coming from them, "or the whole meteor itſelf (adds our author), it is ſaid, has damaged ſhips, houſes, &c. after the manner of lightning." This laſt circumſtance, however, we can believe only of another kind of fire-balls, of which we ſhall afterwards treat, which keep at a ſmall diſtance from the earth, or run along its ſurface; for the great meteors of which we now ſpeak, flying at the diſtance of 50 or 60, or more miles from the ſurface of the earth cannot be leſs from their apparent ſize than a mile or a mile and an half in diameter. Such an immenſe body of electric matter deſcending on the earth, would by its exploſion ruin a large tract of country; and there is no probability that when engendered in ſuch a rare atmoſphere it could break through the whole body of groſs and denſe air which lies between theſe regions and the earth, and which we know reſiſts the paſſage of the electric fluid very ſtrongly. Notwithſtanding this there is no impoſſibility that the atmoſphere may be electrified to a great degree by ſuch a meteor paſſing over it; and thus electrical appearances may attend theſe bodies without any actual emiſſion of their ſubſtance, as Dr Blagden ſuppoſes. "If there be really (ſays he) any hiſſing noiſe heard while the meteors are paſſing, it ſeems explicable on no other ſuppoſition than that of ſtreams of electric matter iſſuing from them, and reaching the earth with a velocity equal to that of the meteor, namely, in two or three ſeconds. Accordingly, in one of our late meteors, the hiſſing was compared to that of electricity iſſuing from a conductor. The ſparks flying off ſo perpetually from the body of fire-balls may poſſibly have ſome connection with theſe ſtreams. In the ſame manner the ſound of exploſions may perhaps be brought to us quicker than if it was propagated to us by the air alone. Should theſe ideas be well founded, the change of direction, which meteors ſeem at times to undergo, may poſſibly be influenced by the ſtate of the ſurface of the earth over which they are paſſing, and to which the ſtreams are ſuppoſed to reach. A ſimilar cauſe may occaſion the apparent exploſion, the opening of more channels giving new vent and motion to the electric fluid. May not the deviation and exploſion which appear to have taken place in the fire-ball of the 18th of Auguſt over Lincolnſhire, have been determined by its approach towards the fens, and an attraction produced by that large body of moiſture?"

The exploſion mentioned by our author over Lincolnſhire does not ſeem to have been the only one which happened during the courſe of this meteor. Several people heard reports after it had vaniſhed; and theſe were ſometimes ſingle and ſometimes double. At Edinburgh two reports were heard, the one immediately following the other, at the diſtance of ſix or ſeven minutes after the meteor had paſſed. Theſe reports no doubt indicated a temporary diſſolution of the body; but it is by no means probable that the diſſolution could have taken place either on account of the ſtate of the earth or atmoſphere. We muſt conſider that both earth and atmoſphere are always full of electric fluid; and if there happens to be what is called a *deficiency* (A) in one of them, the other inſtantly ſupplies it. It is impoſſible, therefore, that either the earth or atmoſphere could receive ſuch an immenſe additional quantity in one part without a vent being provided for it ſomewhere elſe. In thunder ſtorms we naturally conclude that a vaſt quantity of electrical matter is put in motion; but from the effects of lightning it appears that this quantity muſt be very trifling in compariſon with what the meteor we now ſpeak of contained. A violent flaſh of lightning has been known to perforate a looking-glaſs, and make only a hole about an inch diameter. Now we have no reaſon to ſuppoſe that the flaſh, tremendous as it might appear to our eyes, was any other than an electric ſpark of an inch in diameter. The meteor, on the other hand, appears not to have been leſs than a mile in diameter; ſo that the diſproportion betwixt it and a ſingle flaſh of lightning appears almoſt beyond calculation; and we may reaſonably conclude that it could not have been equalled by 10,000 thunder ſtorms. Had this amazing body of electric fire deſcended through the atmoſphere and diſſipated itſelf on the fens of Lincolnſhire, it muſt have produced the moſt violent and unheard of effects, not only in that place, but probably throughout the whole iſland. Its diſſipation muſt therefore have been in the higher regions, where there was ample ſpace to receive it; and where its exploſion, whatever concuſſion it might make among the etherial matter itſelf, could not affect our earth or atmoſphere in any remarkable

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(A) A real deficiency can never happen with regard to the electric fluid in any ſubſtance whatever, as is ſhown at large under the article ELECTRICITY, as well as many others in this work. What ſeems a deficiency is only when the fluid has a tendency to circulate. In this caſe, as the motion muſt begin in one place and return from another, the place where it begins ſeems to be deficient, becauſe the fluid is going away from it; while that from which it returns ſeems, for a ſimilar reaſon, to have too much.

markable degree. Its re-appearance was owing to the ſame tendency in the fluid to circulate which had originally produced it; and which probably was the violent earthquake in Calabria and the eruption in Iceland. See EARTHQUAKE, n° 111.

3. Another argument adduced by Dr Blagden in favour of the electrical origin of fire-balls, is their connection with the aurora borealis, and the reſemblance they bear to theſe phenomena, which are now almoſt univerſally allowed to be electrical. "Inſtances (ſays he) are recorded, where northern lights have been ſeen to join, and form luminous balls, darting about with great velocity, and even leaving a train behind them like the common fire-balls. This train I take to be nothing elſe but the rarefied air left in ſuch an electrified ſtate as to be luminous; and ſome ſtreams of the northern lights are very much like it." The aurora borealis appears to occupy as high, if not a higher region above the ſurface of the earth, as may be judged from the very diſtant countries to which it has been viſible at the ſame time: indeed the great accumulation of electric matter ſeems to lie beyond the verge of our atmoſphere, as eſtimated by the ceſſation of twilight. Alſo with the northern lights a hiſſing noiſe is ſaid to be heard in ſome very cold climates: Gmelin ſpeaks of it in the moſt pointed terms, as frequent and very loud in the north-eaſtern parts of Siberia*; and other travellers have related ſimilar facts."

4. Our author thinks that the ſtrongeſt argument for the electrical origin of theſe meteors is the direction of their courſe, which is conſtantly either from the north or north-weſt quarter of the heavens, or towards it; or, as our author thinks, nearly in the direction of the magnetical meridian. Such a courſe, however, ſeems only to belong to the very large fire-balls of which we now ſpeak; the ſmaller ones, called *Falling* STARS, being moved in all directions; "perhaps (ſays the Doctor), becauſe they come further within the verge of our atmoſphere, and are thereby expoſed to the action of extraneous cauſes. That the ſmaller ſort of meteors, ſuch as ſhooting ſtars, are really lower down in the atmoſphere, is rendered very probable by their ſwifter apparent motion; perhaps it is this very circumſtance which occaſions them to be ſmaller, the electric fluid being more divided in more reſiſting air. But as thoſe maſſes of electric matter which move where there is ſcarce any reſiſtance, ſo generally affect the direction of the magnetic meridian, the ideas which have been entertained of ſome analogy between theſe two obſcure powers of nature ſeem not altogether without foundation. If the foregoing conjectures be juſt, diſtinct regions are allotted to the electrical phenomena of our atmoſphere. Here below we have thunder and lightning, from the unequal diſtribution of the electric fluid among the clouds in the loftier regions, whither the clouds never reach, we have the various gradations of falling ſtars; till, beyond the limits of our corpuſcular atmoſphere, the fluid is put into motion in ſufficient maſſes, to hold a determined courſe and exhibit the different appearances of what we call fire balls: and probable at a ſtill greater elevation above the earth, the electricity accumulates in a lighter and leſs condenſed form, to produce the wonderfully diverſified ſtreams and coruſcations of the aurora borealis.

The paper from whence theſe extracts are taken was written before Mr Morgan's account of the non-conducting power of a perfect vacuum made its appearance. An abſtract of his arguments on this ſubject is given under the article ELECTRICITY, n° 130—137. and their inſufficiency to prove the point intended, is ſhown under the ſame article, n° 277. Under that article, we have only mentioned the *deficiency* in Mr Morgan's argument, without adducing any poſitive proof to the contrary. Such a proof, however, is offered by the meteor in queſtion, or by others of the ſame nature. Dr Halley, ſpeaking of the fire-ball of 1719, the height of which he calculated at very little leſs than 70 miles, expreſſes his ſurpriſe that ſound ſhould be propagated through a medium near 300,000 times rarer than the common air, and the next thing to a perfect vacuum. Now it remains, and for ever will remain, to be proved, that Mr Morgan's moſt perfect vacuum, formed by boiling quickſilver in a tube ever ſo long, contains a medium *more* than 300,000 times rarer than the common atmoſphere. From Mr Cavallo's experiments* it appears, that when air is only rarefied 1000 times, the electric light is exceſſively weak; ſo that there is not the leaſt probability that in an aerial medium 300,000 times rarer than the preſent, if indeed ſuch a medium can exiſt, there could be any light made viſible in the ordinary experiments. We ſee, however, by the many examples of meteors which have occurred at prodigious heights in the atmoſphere, that the electric light in ſuch a rarefied atmoſphere is not only viſible, but acts as vigorouſly in every reſpect as if it were on the ſurface of the earth. This circumſtance therefore affords a complete demonſtration of the fallacy of Mr Morgan's argument, and a direct proof that the electric fluid pervades ſpace as completely diveſted of air as the beſt artificial vacuum we can make; nay, where it is generally believed by mathematicians that the atmoſphere has ceaſed altogether. His other arguments drawn *à priori* are ſtill more inconcluſive than that we have juſt mentioned. He tells us, that if a vacuum was a conductor, the whole quantity of electric matter contained in the earth and atmoſphere would be perpetually flying off through the regions of infinite ſpace as being ſurrounded by a boundleſs conductor. But even this does not follow, though we ſhould ſuppoſe theſe regions to be an abſolute vacuity; for we know that electricity does not fly to a conducting ſubſtance merely becauſe it is a conductor, but becauſe it opens a paſſage to ſome place whither it has a tendency to go though the conductor was not there. Now, on the preſent hypotheſis, as the conductor would lead to *no place* to which the electric matter had any previous tendency, we cannot aſſign any reaſon why it ſhould acquire a tendency to fly off merely on account of the neighbourhood of a conductor, even though boundleſs. His other objection (that on the ſuppoſition of a vacuum being capable of conducting electricity, the whole ſpace in the univerſe would be filled with electric fluid) may be admitted in its fulleſt extent, without any detriment whatever to ſcience: and indeed, if we allow the electric fluid to be only a modification of the light of the ſun, as is rendered very probable under the article ELECTRICITY, ſect. vi. as well as that of FIRE, and many others in various places of this

* See *Aurora Borealis*.

* See *Electricity*, n° 142.

work, we muſt own that the whole univerſe is filled with it. The meteors in queſtion will be no other than diſcharges of electricity from one part of the celeſtial ſpaces to another, ſimilar to the diſcharges between the poſitive and negative ſide of an electrified bottle, thus intimating, that a circulation has taken place in the fluid, which the meteor at once completes and puts an end to. See the article METEOROLOGY.

Beſides theſe already juſt mentioned of ſuch vaſt magnitude, there are others much ſmaller and nearer the ſurface of the earth, rolling upon it, or falling upon it, exploding with violence, as is the caſe with thoſe which appear in the time of thunder, and frequently produce miſchievous effects. One of theſe is mentioned by ſome authors as falling in a ſerene evening in the iſland of Jamaica; exploding as ſoon as it touched the ſurface of the ground, and making a conſiderable hole in it. Another is mentioned by Dr Prieſtley as rolling along the ſurface of the ſea, then riſing and ſtriking the top-maſt of a man of war, exploding, and damaging the ſhip. In like manner we hear of an electrified cloud at Java in the Eaſt Indies: whence, without any thunder-ſtorm, there iſſued a vaſt number of fire-balls, which did incredible miſchief. This laſt phenomenon points out to us the true origin of balls of this kind, viz. an exceſſive accumulation of electricity in one part, or a violent tendency to circulate, when at the ſame time the place where the motion begins is at ſo great a diſtance, or meets with other obſtables of ſuch a nature, that it cannot eaſily get thither. Urged on, however, by the vehement preſſure from behind, it is forced to leave its place; but being equally unable to diſplace the great quantity of the ſame fluid, which has no inclination to move the ſame way with itſelf, it is collected into balls, which run hither and thither, according as they meet with conductors capable of leading them into ſome part of the circle. This is even confirmed by an experiment related at the end of Dr Prieſtley's fifth volume on Air. He relates that a gentleman having charged with a very powerful machine, a jar, which had the wire ſupporting the knob of a conſiderable length, and paſſed through a glaſs-tube, a globe of fire was ſeen to iſſue out of it. This globe gradually aſcended up the glaſs-tube till it came to the top of the knob, where it ſettled, turning ſwiftly on its axis, and appearing like a red-hot iron ball of three quarters of an inch diameter. On continuing to turn the machine, it gradually deſcended into the jar; which it had no ſooner done, than there iſſued a moſt violent exploſion and flaſh, the jar being diſcharged and broken at the ſame time. This experiment, however, is ſingular in its kind; for neither the gentleman who performed it, nor any other, has yet been able to repeat it. Single as it is, however, we may yet gather from it, that a fire-ball will be the conſequence of a very violent electrification of any ſubſtance, provided at the ſame time that the air be in a very non-conducting ſtate, ſo that the electricity may not evaporate into it as faſt as it is collected; for this would produce only lucid ſtreams and flaſhes, as in the common experiments with the Leyden phial: and it is probably an inattention to this circumſtance which has hitherto prevented the repetition of the experiment abovementioned. The caſe is the ſame in thunder-ſtorms, where an exceſſive accumulation of electric matter always produces fire-balls, the moſt miſchievous kind of lightning, as is explained under that article.

With regard to the uſes which fire-balls ſerve in the ſyſtem of nature, it is plain that they are the means of preſerving the equilibrium in the electric fluid in the atmoſphere, which would otherwiſe produce the moſt dreadful tempeſts. Under the article *AURORA Borealis*, it is ſhown why there muſt be a conſtant current of electric matter through the bowels of the earth from the equator to the poles, and from the poles to the equator through the atmoſphere. The great meteors ſerve for keeping up the equilibrium in this great atmoſpherical current, while the ſmaller ones anſwer a like purpoſe in the general maſs of electric matter diſperſed over the face of the earth, and therefore are ſeen to move in all directions, as the equilibrium happens to require them in different parts. With regard to thoſe which are obſerved in the lower regions of the earth, or rolling on the ſurface of the ground itſelf, they undoubtedly anſwer purpoſes of a ſimilar kind in theſe lower regions; for as fire-balls in general are produced by a great exceſs of electricity in one place there muſt of courſe be an equal deficiency in another; and to reſtore the equilibrium, or, to ſpeak more properly, to prevent a dangerous commotion from taking place throughout the whole maſs of electric fluid, the fire ball break forth, and either puts a ſtop at once to the diſturbance by an exploſion, or by ſilent and inviſible evaporation. From ſome accounts indeed it would ſeem that even the large celeſtial meteors detached part of their ſubſtance to accompliſh this purpoſe; though, for the reaſons already given, it would ſeem more probable that they operated by electrifying the atmoſphere, or ſetting the fluid contained in it in motion, ſo as to produce ſmall fire-balls of itſelf, rather than by detaching any part of their own bodies to ſuch a diſtance. Dr Blagden, in the paper above quoted, gives an account of an appearance of this kind. It was deſcribed in a letter to Sir Joſeph Banks from the Abbé Mann, director of the academy at Bruſſels. "It happened (ſays the Abbé) at Mariekercke, a ſmall village on the coaſt, about half a mile weſt of Oſtend. The curate of the village was ſitting in the duſk of the evening with a friend, when a ſudden light ſurpriſed them, and, immediately after a ſmall ball of light-coloured flame came through a broken pane of glaſs, croſſed the room where they were ſitting, and fixed itſelf on the chink of a door oppoſite to the window where it entered, and there died gradually away. It appeared to be a kind of phoſphoric light carried along by the current of air. The curate and his friend greatly ſurpriſed at what they ſaw, apprehended fire in the neighbourhood; but going out, found that the fire which had come in through the window had been detached from a large meteor in its paſſage,"

FIRE-Cocks. Churchwardens in London and within the bills of mortality, are to fix fire-cocks at proper diſtances in ſtreets, and keep a large engine and hand engine for extinguiſhing fire, under the penalty of ſtat. 5 Ann. c. 31.

On the breaking out of any fire in London or Weſtminſter, the conſtables and beadles of pariſhes ſhall repair to the place with their ſtaves, and aſſiſt in extinguiſhing it, and cauſe the people to work for that end, &c.

Fire-Engine. See *Steam Engine.*

Fire-Flair, in ichthyology. See Raja.

Fire-Flies, a ſpecies of flies common in Guiana, of which there are two ſpecies. The largeſt is more than an inch in length, having a very large head connected with the body by a joint of a particular ſtructure, with which at ſome times it makes a loud knock, particularly when laid on its back. The fly has two feelers or horns, two wings, and ſix legs. Under its belly is a circular patch, which, in the dark, ſhines like a candle; and on each ſide of the head near the eyes is a prominent, globular luminous body, in ſize about one-third larger than a muſtard ſeed. Each of theſe bodies is like a living ſtar, emitting a bright, and not ſmall, light; ſince two or three or of theſe animals, put into a glaſs-veſſel, afford light ſufficient to read without difficulty, if placed cloſe to the book. When the fly is dead, theſe bodies will afford conſiderable light, though it is leſs vivid than before; and if bruiſed, and rubbed over the hands or face, they become luminous in the dark, like a board ſmeared over with Engliſh phoſphorus. They have a reddiſh-brown or cheſnut colour; and live in rotten trees in the day, but are always abroad in the night. The other kind is not more than half as large as the former: their light proceeds from under their wings, and is ſeen only when they are elevated, like ſparks of fire appearing or diſappearing at every ſecond. Of theſe the air is full in the night, tho' they are never ſeen in the day. They are common not only in the ſouthern, but in the northern parts of America, during the ſummer.

Fire-Lock, or *Fuſil*, a ſmall gun which fires with a flint. It is diſtinguiſhed from an old muſket, or match-lock, which was fired with a match. The fire-lock is now in common uſe in the European armies.

Fire-Philoſophers, or *Philoſophi per ignem*, a fanatical ſect of philoſophers who appeared towards the cloſe of the 16th century, and made a figure in almoſt all the countries of Europe. The diſtinguiſhing tenet from which they derived this appellation was, that the intimate eſſences of natural things were only to be known by the trying efforts of fire, directed in a chemical proceſs. They were alſo called *Theoſophiſts*, from their declaring againſt human reaſon as a dangerous and deceitful guide, and repreſenting a divine and ſupernatural illumination as the only means of arriving at truth: they were likewiſe denominated *Paracelſiſts*, from the name of Paracelſus, the eminent phyſician and chemiſt, who was the chief ornament and leader of this extraordinary ſect. It was patroniſed in England by Robert Flood or Fludd, who endeavoured to illuſtrate the philoſophy of Paracelſus in a great number of treatiſes; in France, it was zealouſly propagated by Rivier; in Denmark, by Severinus; in Germany, by Kunrath, an eminent phyſician of Dreſden; and in other countries by warm and ſucceſsful votaries, who aſſumed a ſtriking air of piety and devotion, and propoſed to themſelves no other end than the advancement of the divine glory, and the reſtoration of peace and concord in a divided church: accordingly they were joined by ſeveral perſons eminent for their piety, and diſtinguiſhed by their zeal for the advancement of true religion. One of the moſt celebrated of theſe was Daniel Hoffman, profeſſor of divinity in the univerſity of Helmſtadt, who, availing himſelf of ſome unguarded paſſages in the writings of Luther, extravagantly maintained, that philoſophy was the mortal enemy of religion; that truth was diviſible into two branches, the philoſophical and theological; and that what was true in philoſophy was falſe in theology. Hoffman was afterwards obliged, by the interpoſition of Henry Julius, duke of Brunſwick, to retract his invectives againſt philoſophy, and to acknowledge in the moſt open manner the harmony and union of ſound philoſophy with true and genuine theology.

Fire-Places are contrivances for communicating heat to rooms, and alſo for anſwering various purpoſes of art and manufacture. See Chimney, Furnace, and Stove.

The late ingenious Dr Franklin, having recounted the inconveniences and advantages of fire-places in common uſe, propoſes a new contrivance for this purpoſe, called the *Pennſylvania fire-place*. 1. This machine conſiſts of a bottom-place or hearth-piece (ſee fig. 1.) with a riſing moulding before for a fender, two perforated ears *F, G*, for receiving two ſcrew-rods; a long air-hole *a a*, through which the outward air paſſes into an air-box; and three ſmoke-holes repreſented by dark ſquares in *BC*, thro' which the ſmoke deſcends and paſſes away; beſides, double ledges for receiving between them the lower edges of the other plates. 2. A back plate without holes, and furniſhed with a pair of ledges to receive, 3. The two ſide-plates, each of which has a pair of ledges to receive the ſide-edges of the front plate, with a ſhoulder on which it reſts; two pair of ledges to receive the ſide-edges of the two middle plates which form the air-box, and an oblong air-hole near the top, through which the air warmed in the box is diſcharged into the room, and a wing or bracket as *H*, and a ſmall hole as *R*, for the axis of the regiſter to turn in. See fig. 2. which repreſents one of theſe plates. 4. An air-box, compoſed of the two middle plates *D E* and *F G*, fig. 3. and 4. The firſt has five thin ledges or partitions caſt on it, the edges of which are received into ſo many pair of ledges caſt in the other: the tops of all the cavities formed by theſe thin deep ledges are alſo covered by a ledge of the ſame form and depth caſt with them; ſo that when the plates are put together, and the joints luted, there is no communication between the air-box and the ſmoke. In the winding paſſages of this box, freſh air is warmed as it paſſes into the room. 5. A front-plate, which is arched on the under ſide, and ornamented with foliages, &c. 6. A top plate, with a pair of ears *M, N*, (fig. 5.) anſwerable to thoſe in the bottom plate, and perforated for the ſame purpoſe. It has alſo a pair of ledges running round the under ſide to receive the top edges of the front, back, and ſide plates. The air-box does not reach up to the top-plate by $2\frac{1}{5}$ inches.

Plate CXCIII.

All theſe plates are of caſt iron; and when they are all in their proper places, they are bound firmly together by a pair of ſlender rods of wrought iron with ſcrews, and the machine appears as in fig. 5. There are alſo two thin plates of wrought iron, viz. 7. The ſhutter, which is of ſuch a length and breadth as to cloſe well the opening of the fire-place, and ſerving to blow up the fire, and to ſecure it in the night. It is raiſed or depreſſed by means of two braſs knobs, and ſlides in a groove left between the foremoſt ledge of the ſide plates and the face of the front plate. 8. The regiſter, which is placed between the back plate and air-box, and furniſhed with a key; ſo that it may be turned on its axis, and made to lie in any poſition between level and upright. The operation of this machine, and the method of fixing it, may be underſtood by obſerving the profile of the chimney and fire-places in fig. 6. *M* is the mantle-piece or breaſt of the chimney; *C* the funnel; *B* the falſe back, made of brick-work in the chimney, four inches or more from the true back, from the top of which a cloſing is to be made over to the breaſt of the chimney, that no air may paſs into the chimney except that which goes under the falſe back, and up behind it; *E* the true back of the chimney: *T* the top of the fire-place; *F* the front of it; *A* the place where the fire is made; *D* the air-box; *K* the hole in the ſide plate, thro' which the warmed air is diſcharged out of the air-box into the room; *H* the hollow, formed by removing ſome bricks from the hearth under the bottom plate filled with freſh air, entering at the paſſage *I*, and aſcending into the air-box through the air-hole in the bottom plate near *G*, the partition in the hollow, deſigned to keep the air and ſmoke apart; *P* the paſſage under the falſe back, and part of the hearth for the ſmoke; and the arrows in the figure ſhow the courſe of the ſmoke. The fire being made at *A*, the flame and ſmoke will aſcend, ſtrike the top *T*, and give it a conſiderable heat; the ſmoke will turn over the air-box, and deſcend between it and the back plate to the holes near *G* in the bottom plate, heating in its paſſage all the plates of the machine: it will then proceed under and behind the falſe back, and riſe into the chimney. The air of the room contiguous to the ſeveral plates, and warmed by them, becomes ſpecifically lighter than the other air in the room, and is obliged to riſe; but being prevented by the cloſure over the fire-place from going up the chimney, is forced out into the room, and riſing by the mantle-piece to the ceiling, is again driven down gradually by the ſteam of newly warmed air that follows; and thus the whole room becomes in a little time equally warmed. The air alſo, warmed under the bottom plate and in the air-box, riſes and comes out of the holes in the ſide plates, and thus warming and continually changing the air of the room. In the cloſing of the chimney a ſquare opening for a trap-door ſhould be left for the ſweeper to go up: the door may be made of ſlate or tin, and ſo placed, that by turning up againſt the back of the chimney when open, it cloſes the vacancy behind the falſe back, and ſhoots the ſoot that falls in ſweeping out upon the hearth. It will alſo be convenient to have a ſmall hole, about five or ſix inches ſquare, cut near the ceiling thro' into the funnel, and provided with a ſhutter; by occaſionally opening which, the heated air of the room and ſmoke of tobacoo, &c. may be carried off without incommoding the company. For a farther account of the manner of uſing this fire-place, the advantages attending it, anſwers to objections, and directions, to the brick-layer in fixing it, the curious reader may conſult Franklin's Letters and Papers on Philoſophical Subjects, p. 284—318. edit. 1769.

Fire-Pots, in the military art, ſmall earthen pots, into which is put a charged grenade, and over that powder enough till the grenade is covered; then the pot is covered with a piece of parchment, and two pieces of match acroſs lighted: this pot being thrown by a handle of matches where it is deſigned, it breaks and fires the powder, and burns all that is near it, and likewiſe fires the powder in the grenade, which ought to have no fuſe, to the end its operations may be the quicker.

Fire-Reeds. See the next article, Note (c.)

Fire-Ship, an old veſſel filled with combuſtible materials, and fitted with grappling irons to hook, and ſet fire to, the enemies ſhips in battle, &c.

As there is nothing particular in the conſtruction of this ſhip, except the apparatus by which the fire is inſtantly conveyed from one part to another, and from thence to the enemy, it will be ſufficient to deſcribe the fire room, where theſe combuſtibles are encloſed, together with the inſtruments neceſſary to grapple the ſhip intended to be deſtroyed.

The fire-room is built between decks, and limited on the after part by a *bulk-head, L,* behind the main-maſt, from which it extends quite forward, as repreſented in Plate CXCIII. The train incloſed in this apartment is contained in a variety of wooden troughs, *D, G,* which interſect each other in different parts of the ſhip's length; being ſupported at proper diſtances by croſs-pieces and ſtanchions. On each ſide of the ſhip are ſix or ſeven ports, *H,* about 18 inches broad and 15 inches high; and having their lids to open downward, contrary to the uſual method.

Againſt every port is placed an iron chamber (a), which, at the time of firing the ſhip, blows out the port-lid, and opens a paſſage for the flame. Immediately under the main and fore-ſhrouds is fixed a wooden funnel *M*; whoſe lower end communicates with a fire-barrel (b), by which the flame paſſing thro' the

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(a) The iron-chambers are 10 inches long and 3.5 in diameter. They are breeched againſt a piece of wood fixed acroſs the ports, and let into another a little higher. When loaded, they are almoſt filled with corn-powder, and have a wooden tompion well driven into their muzzles. They are primed with a ſmall piece of quick-match thruſt through their vents into the powder, with a part of it hanging out. When the ports are blown open by means of the iron-chambers, the port-lids either fall downward, or are carried away by the exploſion.

(b) The fire-barrels ought to be of cylindrical form, as moſt ſuitable to contain the reeds with which they are filled, and more convenient for ſtowing them between the troughs in the fire-room. Their inſide chambers ſhould not be leſs than 21 inches, and 30 inches is ſufficient for their length. The bottom parts are firſt well ſtored with

Falconer's Marine Dictionary.

the funnel is conducted to the ſhrouds. Between the funnels, which are likewiſe called *fire-trunks*, are two ſcuttles, or ſmall holes in the upper deck, ſerving alſo to let out the flames. Both funnels muſt be ſtopped with plugs, and have ſail-cloth or canvas nailed cloſe over them, to prevent any accident happening from above to the combuſtibles laid below.

The ports, funnels, and ſcuttles, not only communicate the flames to the outſide and upper works of the ſhip and her rigging; but likewiſe open a paſſage for the inward air, confined in the fire-room, which is thereby expanded ſo as to force impetuouſly through thoſe out-lets, and prevent the blowing up of the decks, which muſt of neceſſity happen from ſuch a ſudden and violent rarefaction of the air as will then be produced.

On each ſide of the bulk-head behind is cut a hole *L*, of ſufficient ſize to admit a trough of the ſame dimenſions as the others. A leading trough, *L I*, whoſe foremoſt end communicates with another trough within the fire-room, is laid cloſe to this opening, from whence it extends obliquely to a ſally-port *I*, cut thro' the ſhip's ſide. The decks and troughs are well covered with melted roſin. At the time of the firing either of the leading troughs, the flame is immediately conveyed to the oppoſite ſide of the ſhip, whereby both ſides burn together.

The ſpaces *N, O*, behind the fire-room, repreſent the cabins of the lieutenant and maſter, one of which is on the ſtarboard, and the other on the larboard ſide. The captain's cabin, which is ſeparated from theſe by a bulk-head, is exhibited alſo by *P*.

Four of the eight fire-barrels are placed under the four fire-trunks; and the other four between them, two on each ſide the fire-ſcuttles, where they are ſecurely cleated to the deck. The longeſt reeds (C) are put into the fore and aft troughs, and tied down: the ſhorteſt reeds are laid in the troughs athwart, and tied down alſo. The bavins (D), dipped at one end, are tied faſt to the troughs over the reeds, and the curtains are nailed up to the beams, in equal quantities, on each ſide of the fire-room.

The remainder of the reeds are placed in a poſition nearly upright at all the angles of every ſquare in the fire-room, and there tied down. If any reeds are left, they are to be put round the fire-barrels, and other vacant places, and there tied faſt.

Inſtructions to prime.

TAKE up all the reeds, one after another, and ſtrow a little compoſition at the bottom of all the troughs under the reeds, and then tie them gently down again: next ſtrow compoſition upon the upper part of the reeds throughout the fire-room; and upon the ſaid compoſition lay double quick-match upon all the reeds, in all the troughs: the remainder of the compoſition ſtrow all over the fire-room, and then lay your bavins looſe.

Caſt off all the covers of the fire-barrels, and hang the quick-match looſe over their ſides, and place leaders of quick-match from the reeds into the barrels, and from thence into the vent of the chambers, in ſuch a manner as to be certain of their blowing open the ports, and ſetting fire to the barrels. Two troughs of communication from each door of the fire-room to the ſally-ports, muſt be laid with a ſtrong leader of quick-match,

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with ſhort double-dipped reeds placed upright; and the remaining vacancy is filled with fire-barrel compoſition well mixed and melted, and then poured over them. The compoſition uſed for this purpoſe is a maſs of ſulphur, pitch, tar, and tallow.

There are five holes, of three-fourths inch in diameter and three inches deep, formed in the top of the compoſition while it is yet warm; one being in the centre, and the other four at equal diſtances round the ſides of the barrel. When the compoſition is cold and hard, the barrel is primed by filling thoſe holes with fuſe-compoſition, which is firmly driven into them, ſo as to leave a little vacancy at the top to admit a ſtrand of quick-match twice doubled. The centre-hole contains two ſtrands at their whole length, and every ſtrand muſt be driven home with mealed powder. The looſe ends of the quick-match being then laid within the barrel, the whole is covered with a dipped curtain, faſtened on with a hoop that ſlips over the head of the barrel, to which it is nailed.

The barrels ſhould be made very ſtrong, not only to ſupport the weight of the compoſition before firing, when they are moved or carried from place to place, but to keep them together whilſt burning: for if the ſtaves are too light and thin, ſo as to burn very ſoon, the remaining compoſition will tumble out and be diſſipated, and the intention of the barrels, to carry the flame aloft, will accordingly be fruſtrated.

The curtain is a piece of coarſe canvas, nearly a yard in breadth and length, thickened with melted compoſition, and covered with ſaw-duſt on both ſides.

(C) The reeds are made up in ſmall bundles of about a foot in circumference, cut even at both ends, and tied together in two places. They are diſtinguiſhed into two kinds, viz. the long and ſhort; the former of which are four feet, and the latter two feet five inches in length. One part of them are ſingly dipped, *i. e.* at one end: the reſt are dipped at both ends in a kettle of melted compoſition. After being immerſed about ſeven or eight inches in this preparation, and then drained, they are ſprinkled over with pulveriſed ſulphur upon a tanned hide.

(D) The bavins are made of birch, heath, or other buſh-wood, which is tough and readily kindled. They are uſually two or three feet in length, and have all their buſh-ends lying one way, the other ends being tied together with ſmall cords. They are dipped in compoſition at the buſh-ends, whoſe branches are afterwards confined by the hand, to prevent them from breaking off by moving about; and alſo to make them burn more fiercely. After being dipped in the ſame manner as the reeds, they alſo are ſprinkled with ſulphur.

match, four or five times double: alſo a croſs-piece to go from the ſally-port, when the ſhip is fired, to the communication trough, laid with leaders of quick-match, that the fire may be communicated on both ſides at once.

What quick-match is left place ſo that the fire may be communicated to all parts of the room at once, eſpecially about the ports and fire-barrels, and ſee that the chambers are well and freſh primed. [N. B. The port-fire uſed for firing the ſhip, burns about 12 minutes. Great care muſt be taken to have no powder on board when the ſhip is fired.]

The ſheer-hooks (repreſented by *A)* are fitted ſo as to faſten on the yard-arms of the fire-ſhip, where they hook the enemy's rigging. The fire-grapplings, *(B.)* are either fixed on the yard-arms, or thrown by hand, having a chain to confine the ſhips together, or faſten thoſe inſtruments wherever neceſſary.

When the commanding officer of a fleet diſplays the ſignal to prepare for action, the fire-ſhips fix their ſheer-hooks, and diſpoſe their grapplings in readineſs. The battle being begun, they proceed immediately to prime, and prepare their fire-works. When they are ready for grappling, they inform the admiral thereof by a particular ſignal.

To avoid being diſabled by the enemy's cannon during a general engagement, the fire-ſhips continue ſufficiently diſtant from their line of battle, either to windward or to leeward.

They cautiouſly ſhun the openings or intervals of the line, where they would be directly expoſed to the enemy's fire, from which they are covered by lying on the oppoſite ſide of their own ſhips. They are attentively to obſerve the ſignals of the admiral or his ſeconds, in order to put their deſigns immediately in execution.

Although no ſhips of the line ſhould be previouſly appointed to protect any fire-ſhip, except a few of the ſmalleſt particularly deſtined to this ſervice, yet the ſhip before whom ſhe paſſes in order to approach the enemy, ſhould eſcort her thither, and aſſiſt her with an armed boat, or whatever ſuccour may be neceſſary in her ſituation.

The captain of the fire-ſhip ſhould himſelf be particularly attentive that the above inſtructions are punctually executed, and that the yards may be ſo braced when he falls along-ſide of the ſhip intended to be deſtroyed, that the ſheer-hooks and grapplings faſtened to the yard-arms, &c. may effectually hook the enemy. He is expected to be the laſt perſon who quits the veſſel; and being furniſhed with every neceſſary aſſiſtance and ſupport, his reputation will greatly depend on the ſucceſs of his enterpriſe.

Lambent FIRES, as the ſhining of meat at certain ſeaſons, the luminouſneſs of the ſea, of inſects, vapours, &c. See the article LIGHT, PHOLAS MEDUSA, NEREIS, *FIRE-Flies, GLOW-Worm,* &c.

PORT-*Fire*. See PORT-*Fire*.

SPUR-FIRE. See SPUR-*Fire*.

FIRE-*Works*, are preparations made of gun-powder, ſulphur, and other inflammable and combuſtible ingredients, uſed on occaſion of public rejoicings and other ſolemnities.

The invention of fire-works is by M. Mahudel attributed to the Florentines and people of Sienna; who found out likewiſe the method of adding decorations to them of ſtatues, with fire iſſuing from their eyes and mouths.

The art of preparing and managing theſe is called *pyrotechny*. See PYROTECHNY.

FIRING, in the military art, denotes the diſcharge of the fire-arms; and its object is to do the utmoſt execution to the enemy.

The preſent method of firing by platoons is ſaid to have been invented by Guſtavus Adolphus, and firſt uſed about the year 1618: the reaſon commonly given for this method is, that a conſtant fire may be always kept up. There are three different ways of platoon firing; viz. ſtanding, advancing, and retreating. But previous to every kind of firing, each regiment or battalion muſt be told off in grand diviſions, ſubdiviſions, and platoons, excluſively of the grenadiers, which form two ſubdiviſions or four platoons of themſelves. In firing ſtanding, either by diviſions or platoons, the firſt fire is from the diviſion or platoon on the right; the ſecond fire from the left; the third from the right again; and ſo on alternately, till the firing comes to the centre platoon, which is generally called the *colour platoon*, and does not fire, remaining as a reſerve for the colours. Firing advancing is performed in the ſame manner with this addition, that before either diviſion or platoon fires, it advances three paces forward. Firing retreating varies from either of the former methods; for before either diviſion or platoon fires, if they are marching from the enemy, it muſt go to the right about, and after firing, to the left about again, and continue the retreat as ſlow and orderly as poſſible.

In hedge-firing the men are drawn up two deep, and in that order both ranks are to fire ſtanding. Oblique firing is either to the right and left, or from the right and left to the centre, according to the ſituation of the object. The Pruſſians have a particular contrivance for this purpoſe; if they are to level to the right, the rear ranks of every platoon make two quick but ſmall paces to the left, and the body of each ſoldier turns one-eighth of a circle, and *vice verſa*. Parapet firing depends on the nature of the parapet over which the men are to fire, and alſo upon that of the attack made to poſſeſs it. This method of firing is ſometimes performed by ſingle ranks ſtepping on the banquette and firing; each man inſtantly handing his arms to the centre rank of the ſame file, and taking his back in the room of it; and the centre rank giving it to the rear to load, and forwarding the arms of the rear to the front rank; by which means the front rank men can fire ſix or ſeven rounds in a minute with exactneſs. Parapet firing may alſo be executed two deep, when the banquette is three feet broad, or in field works, where not banquettes are made. Square firing is performed by a regiment or body of men drawn up in a hollow ſquare, in which caſe each front is generally divided into four diviſions or firings, and the flanks of the ſquare, being the weakeſt part, are covered by four platoons of grenadiers. The firſt fire is from the right diviſion of each face; the ſecond from the left diviſion of each face, &c. and the grenadiers make the laſt fire. Street-firing is practiſed in two ways; either by making the diviſion or platoon that has fired to wheel by half-rank to the right and left outwards from the centre, and to march in that order by half diviſions down the flanks on each ſide of the column, and to draw up in the rear, and go on with their priming and loading; or, to make the diviſion or platoon, after firing, to face to the right and left outwards from the centre, and one half rank to follow the other; and in that order to march in one centre file down on each ſide of the column into the rear, and there draw up as before.

Firing-Iron, in farriery, an inſtrument not unlike the blade of a knife; which being made red-hot, is applied to a horſe's hams, or other places ſtanding in need of it, as in preternatural ſwellings, farcy, knots, &c. in order to diſcuſs them.

FIRKIN, an Engliſh meaſure of capacity for things liquid, being the fourth part of a barrel: it contains eight gallons of ale, ſoap, or herrings, or nine gallons of beer.

FIRLOT, a dry meaſure uſed in Scotland. The oat-firlot contains 21¼th pints of that country; the wheat-firlot contains about 2211 cubical inches; and the barley-firlot 21 ſtandard-pints. Hence it appears that the Scotch wheat-firlot exceeds the Engliſh buſhel by 33 cubical inches.

FIRMAMENT, in the ancient aſtronomy, the eighth heaven or ſphere; being that wherein the fixed ſtars were ſuppoſed to be placed. It is called the *eighth*, with reſpect to the ſeven heavens or ſpheres of the planets which it ſurrounds.

It is ſuppoſed to have two motions; a diurnal motion, given it by the *primum mobile*, from eaſt to weſt, about the poles of the ecliptic; and another oppoſite motion from weſt to eaſt; which laſt it finiſhes, according to Tycho, in 25,412 years; according to Ptolemy, in 36,000; and according to Copernicus, in 258,000; in which time the fixed ſtars return to the ſame preciſe points wherein they were at the beginning. This period is commonly called Plato's year, or the great year.

In various places of Scripture, the word *firmament* is uſed for the middle region of the air. Many of the ancients allowed, with the moderns, that the firmament is a fluid matter; though they, who give it the denomination of *firmament*, muſt have taken it for a ſolid one.

FIRMAN, is a paſſport or permit granted by the Great Mogul to foreign veſſels, to trade within the territories of his juriſdiction.

FIRMICUS MATERNUS (Julius), a famous writer, who compoſed in Latin, about the year 345, an excellent book in defence of Chriſtianity, intitled *De errore profanarum religionum*, which is printed with the notes of John Wouver. There are alſo attributed to him eight books of aſtronomy, printed by Aldus Manutius in 1501; but this laſt work appears to have been written by another Julius Firmicus, who lived at the ſame time.

FIRMNESS, denotes the conſiſtence of a body, or that ſtate wherein its ſenſible parts cohere in ſuch a manner, that the motion of one part induces a motion in the reſt.

FIRST-BORN. See PRIMOGENITURE, for the literal meaning of the term.

In Scripture it is alſo often uſed in a figurative ſenſe for that which is firſt, moſt excellent, moſt diſtinguiſhed in any thing. Thus it is ſaid of Chriſt (Col. i. 5.), that he is "the firſt-born of every creature;" and in Revelations (i. 5.), he is called "the firſt begotten of the dead;" that is, according to the commentators, Begotten of the Father before any creature was produced; and the firſt who roſe from the dead by his own power. "The firſt born of the poor," (Iſa. xiv. 30.) ſignifies, The moſt miſerable of all the poor; and in Job (xviii. 13), "The firſt-born of death;" that is, The moſt terrible of all deaths.

First-Fruits (primitiæ), among the Hebrews, were oblations of part of the fruits of the harveſt, offered to God as an acknowledgment of his ſovereign dominion. The firſt of theſe fruits was offered in the name of the whole nation, being either two loaves of bread, or a ſheaf of barley which was threſhed in the court of the temple. Every private perſon was obliged to bring his firſt-fruits to the temple; and theſe conſiſted of wheat, barley, grapes, figs, apricots, olives, and dates.

There was another ſort of firſt-fruits which were paid to God. When bread was kneaded in a family, a portion of it was ſet apart, and given to the prieſt or Levite who dwelt in the place: if there was no prieſt or Levite there, it was caſt into the oven, and conſumed by the fire. Theſe offerings made a conſiderable part of the revenues of the Hebrew prieſthood.

Firſt-fruits are frequently mentioned in ancient Chriſtian writers as one part of the church revenue. One of the councils of Carthage enjoins, that they ſhould conſiſt only of grapes and corn; which ſhows that this was the practice of the African church.

First-Fruits, in the church of England, are the profits of every ſpiritual benefice for the firſt year, according to the valuation thereof in the king's books.

FISC, FISCUS, in the civil law, the treaſury of a prince or ſtate; or that to which all things due to the public do fall. The word is derived from the Greek φισκος "a great baſket," uſed when they went to market.—By the civil law, none but a ſovereign prince has a right to have a fiſc or public treaſury.

At Rome, under the emperors, the term *ærarium* was uſed for the revenues deſtined for ſupport of the charges of the empire; and *fiſcus* for thoſe of the emperor's own family. The treaſury, in effect, belonged to the people, and the fiſcus to the prince. Hence the goods of condemned perſons, if appropriated to the uſe of the public, were ſaid *publicari;* if to the ſupport of the emperor or prince, *confiſcari.*

FISCAL, in the civil law, ſomething relating to the pecuniary intereſt of the prince or people. The officers appointed for the management of the fiſc, were called *procuratores fiſci;* and *advocati fiſci;* and among the caſes enumerated in the conſtitutions of the empire where it was their buſineſs to plead, one is againſt thoſe who have been condemned to pay a fine to the fiſc on account of their litigiouſneſs or frivolous appeals.

FISCUS. See FISC.

FISH, in natural hiſtory, an animal that lives in the waters as the natural place of its abode.

Fiſhes form the fourth claſs of animals in the Linnæan ſyſtem. Their moſt general or popular diviſion is into *freſh* and *ſalt* water ones. Some, however, are of opinion, that all fiſhes naturally inhabit the ſalt-waters, and that they have mounted up into rivers only by accident. A few ſpecies only ſwim up into the rivers to depoſit their ſpawn; but by far the greateſt number keep in the ſea, and would ſoon expire in freſh water. There are about 400 ſpecies of fiſhes (according to Linnæus) of which we know ſomething: but the unknown ones are ſuppoſed to be many more; and as they are thought to lie in great depths of the ſea remote from land, it is probable that many ſpecies will remain for ever unknown.

For the ſubdiviſions, characters, and natural hiſtory of this claſs of animals, ſee the articles ICHTHYOLOGY and ZOOLOGY.

Blowing of FISH, is a practice ſimilar to that of blowing fleſh, poultry, and pigs, and adopted for the ſame deceitful purpoſes. The method of blowing fiſh, eſpecially cod and whitings, is by placing the end of a quill or tobacco-pipe at the vent, and pricking a hole with a pin under the fin which is next the gill; thereby making the fiſh appear to the eye large and full; which when dreſſed will be flabby, and little elſe than ſkin and bones. But this impoſition may be diſcovered by placing the finger and thumb on each ſide of the vent, and ſqueezing it hard; the wind may be perceived to go out, the ſkin will fall in, and the fiſh appear lank, and of little value.

Breeding of FISHES may be turned to great advantage; for, beſides furniſhing the table, obliging one's friends, and raiſing money, the land will be thereby greatly improved, ſo as to yield more this way than by any other employment whatever. See *FISH-Pond, infra*; and *BREEDING of FISH*.

Caſtration of FISH, is a method firſt practiſed by Mr Tull, in order to prevent the exceſſive increaſe of fiſh in ſome of his ponds, where the numbers did not permit any of them to grow to an advantageous ſize. But he afterwards found, that the caſtrated fiſh grew much larger than their uſual ſize, were more fat, and always in ſeaſon. This operation may be performed both on male and female fiſh; and the moſt eligible time for it is when the ovaries of the female have their ova in them, and when the veſſels of the male, analogous to theſe, have their ſeminal matter in them; becauſe, at this time, theſe veſſels are more eaſily diſtinguiſhed from the ureters, which convey the urine from the kidneys into the bladder, and are ſituated near the ſeminal veſſels on each ſide of the ſpine; which, without ſufficient attention, may be miſtaken for the ovaries, eſpecially when theſe laſt are empty. The time leaſt proper for this operation, is juſt after they have ſpawned, becauſe the fiſh are then too weak and languid to bear, with ſucceſs, ſo ſevere an operation; however, with ſkill and care, it may be performed almoſt at any time. When a fiſh is to be caſtrated, it muſt be held in a wet cloth, with his belly upwards; then with a ſharp penknife, having its point bent backwards, the operator cuts through the integuments of the rim of the belly, taking care not to wound any of the inteſtines. As ſoon as a ſmall aperture is made, he carefully inſerts a hooked pen-knife, and with this dilates the aperture from between the two fore-fins almoſt to the anus. He then, with two ſmall blunt ſilver-hooks, five or ſix inches long, and of this form Ր, by the help of an aſſiſtant, holds open the belly of the fiſh; and, with a ſpoon or ſpatula, removes carefully the inteſtines from one ſide. When theſe are removed, you ſee the ureter, a ſmall veſſel, nearly in the direction of the ſpine, and alſo the ovary, a larger veſſel, lying before it, nearer the integuments of the belly. This laſt veſſel is taken up with a hook of the ſame kind with thoſe before mentioned, and, after detaching it from the ſide far enough for the purpoſe, divide tranſverſely with a pair of ſharp ſciſſars, care being taken that the inteſtines are not wounded or injured. After one of the ovaries has been divided, the operator proceeds to divide the other in the ſame manner; and then the divided integuments of the belly are ſewed with ſilk, the ſtitches being inſerted at a ſmall diſtance from one another. Mr Tull obſerves further, that the ſpawning time is very various; that trouts are full about Chriſtmas; perch in February; pikes in March, and carp and tench in May; and that allowance muſt be made for climate and ſituation, with regard to the ſpawning of fiſh. When the fiſh are caſtrated, they are put into the water where they are intended to continue; and they take their chance in common with other fiſh, as though they were not caſtrated. With tolerable care, few die of the operation. *Phil. Tranſ.* vol. xlviii. Part 2. art. 106.

Although we could not properly avoid inſerting the above detail, it is preſumed that few will be pleaſed with the invention. The operation is peculiarly cruel, and the purpoſe of it only a deteſtable piece of Apician refinement.

Feeding of FISHES. When they are fed in large pools or ponds, either malt boiled, or freſh grains, is the beſt food; thus carps may be raiſed and fed like capons, and tenches will feed as well. The care of feeding them is beſt committed to a gardener or the butler, who ſhould be always at hand. When fed in a ſtew, any ſort of grain boiled, eſpecially peas, and malt coarſely ground, are proper food; alſo the grains after brewing, while freſh and ſweet; but one buſhel of malt not brewed, will go as far as two of grains.

Stealing of FISH, by perſons armed and diſguiſed, is felony without benefit of clergy by 9 Geo. I. cap. 22. See *BLACK act*. And by 5 Geo. III. cap. 14. the penalty of tranſportation for ſeven years is inflicted on perſons ſtealing or taking fiſh in any water, within a park, paddock, orchard, or yard; and on the receivers, aiders, and abettors; and a forfeiture of five pounds to the owner of the fiſhery is made payable by perſons taking or deſtroying (or attempting ſo to do) any fiſh in any river or other water within any incloſed ground, being private property.

Preſerving of FISH for Cabinets. Linnæus's method is, to expoſe them to the air; and when they acquire ſuch a degree of putrefaction that the ſkin loſes its coheſion to the body of the fiſh, it may be ſlid off almoſt like a glove: the two ſides of this ſkin may then be dried upon paper like a plant, or one of the ſides may be filled with plaſter of Paris, to give the ſubject a due plumpneſs. *Amæn, Acad. tom. iii.*

A fiſh may be prepared, after it has acquired this degree of putrefaction, by making a longitudinal inciſion on the belly, and carefully diſſecting the fleſhy parts from the ſkin, which are but ſlightly attached to it in conſequence of the putreſcency. The ſkin is then to be filled with cotton and the antiſeptic powder as directed for birds; and, laſtly, to be ſewed up where the inciſion was made. See *Methods of Preſerving* BIRDS.

*Gold-*FISH. See CYPRINUS.

Gilding on FISH. In the poſthumous papers of Mr Hooke, a method is deſcribed of gilding live craw-fiſh, carps, &c. without injuring the fiſh. The cement for this purpoſe is prepared, by putting ſome burgundy-pitch into a new earthen pot, and warming the veſſel till it recieves ſo much of the pitch as will ſtick round it; then ſtrewing ſome finely-powdered amber over the pitch when growing cold, addding a mixture of three pounds of linſeed oil and one of oil of turpentine, covering the veſſel, and boiling them for an hour over a gentle fire, and grinding the mixture, as it is wanted, with ſo much pumice-ſtone in fine powder as will reduce it to the conſiſtence of paint. The fiſh being wiped dry, the mixture is ſpread upon it; and the gold-leaf being then laid on, and gently preſſed down, the fiſh may be immediately put into water again, without any danger of the gold coming off, for the matter quickly grows firm in water.

FISH, in a ſhip, a plank or piece of timber faſtened to a ſhip's maſt or yard, to ſtrengthen it; which is done by nailing it on with iron ſpikes, and winding ropes hard about them.

FISHES, in heraldry; are the emblems of ſilence and watchfulneſs; and are borne either upright, imbowed, extended, endorſed reſpecting eachother, ſurmounting one another, fretted, &c.

In blazoning fiſhes, thoſe borne feeding, ſhould be termed *devouring*; all fiſhes borne upright and having fins, ſhould be blazoned *hauriant*; and thoſe borne tranſverſe the eſcutcheon, muſt be termed *naiant*.

Fish-Ponds, thoſe made for the breeding or feeding of fiſh.

Fiſh ponds are no ſmall improvement of watery and boggy lands, many of which are fit for no other uſe. In making of a pond, its head ſhould be at the loweſt part of the ground, that the trench of the flood-gate or ſluice, having a good fall, may not be too long in emptying. The beſt way of making the head ſecure, is to drive in two three rows of ſtakes above ſix feet long, at about four feet diſtance from each other, the whole length of the pond-head, whereof the firſt row ſhould be rammed at leaſt about four feet deep. If the bottom is falſe, the foundation may be laid with quicklime: which ſlaking, will make it as hard as a ſtone. Some lay a layer of lime, and another of earth dug out of the pond among the piles and ſtrakes, and when theſe are well covered; drive in others as they ſee occaſion, ramming in the earth as before, till the pond-head be of the height deſigned.

The dam ſhould be made ſloping on each ſide, leaving a waſte to carry off the over-abundance of water in times of floods or rains; and as to the depth of the pond, the deepeſt part need not exceed ſix feet, riſing gradually in ſhoals towards the ſides, for the fiſh to ſun themſelves, and lay their ſpawn. Gravelly and ſandy bottoms, eſpecially the latter, are beſt for breeding; and a fat ſoil with a white fat water, on the waſhings of hills, commons, ſtreets, ſinks, &c. is beſt for fattening all ſorts of fiſh. For ſtoring a pond, carp is to be preferred for its goodeſs, quick growth, and great increaſe, as breeding five or ſix times a-year. A pond of an acre, if it be a feeding and not breeding one, will every year feed 200 carps of three years old, 300 of two years old, and 400 of a year old. Carps delight in ponds, that have marle or clay bottoms, with plenty of weeds and graſs, where on they feed in the hot months.

Ponds ſhould be drained every three or four years, and the fiſh ſorted. In breeding ones, the ſmaller ones are to be taken out, to ſtore other ponds with, leaving a good ſtock of females, at leaſt eight or nine years old, as they never breed before that age. In feeding ponds, it is beſt to keep them pretty near of a ſize. See BREEDING *of Fiſh*.

FISHER (John), biſhop of Rocheſter, was born at Beverly in Yorkſhire, in the year 1459, and educated in the collegiate church of that place. In 1484, he removed to Michael-houſe in Cambridge, of which college he was elected maſter in the year 1495. Having applied himſelf to the ſtudy of divinity, he took orders; and, becoming eminent as a divine, attracted the notice of Margaret counteſs of Richmond, mother of Henry VII. who made him her chaplain and confeſſor. In 1501, he took the degree of doctor of divinity, and the ſame year was elected chancellor of the univerſity. In the year following, he was appointed Lady Margaret's firſt divinity-profeſſor; and, in 1504 conſecrated biſhop of Rocheſter; which ſmall biſhopric he would never reſign, though he was offered both Ely and Lincoln. It is generally allowed, that the foundation of the two colleges of Chriſt-church and St John's in Cambrige, was entirely owing to biſhop Fiſher's perſuaſions, and influence with the counteſs of Richmond: he not only formed the deſign, but ſuperintended the execution. On the promulgation of Martin Luther's doctrine, our biſhop was the firſt to enter the liſts againſt him. On this occaſion he exerted all his influence, and is generally ſuppoſed to have written the famous book by which Henry. VII. obtained the title of *Defender of the Faith*. Hitherto he continued in favour with the king; but in 1527, oppoſing his divorce, and denying his ſupremacy, the implacable Harry determined, and, finally effected, his deſtruction. In 1534, the parliament found him guilty of miſpriſion of treaſon, for concealing certain prophetic ſpeeches of a fanatical impoſtor, called the *Holy Maid of Kent*, relative to the king's death; and condemned him with five others, in loſs of goods, and impriſonment during his majeſty's pleaſure; but he was releaſed on paying 300 l. for the king's uſe.

King Henry being now married to Anne Boleyn, his obſequious parliament took an oath of allegiance proper for the occaſion. This oath the biſhop of Rocheſter ſteadily refuſed; alledging that his conſcience could not be convinced that the king's firſt marriage was againſt the law of God. For refuſing this oath of ſucceſſion, he was attainted by the parliament of 1534; and committed to the Tower, where he was cruelly treated, and where he would probably have died a natural death, had not the pope created him a cardinal. The king, now poſitively determined on his deſtruction, ſent Rich the ſolicitor-general, under a pretenſe of conſulting the biſhop on a caſe of conſcience, but really with a deſign to draw him into a converſation concerning the ſupremacy. The honeſt old biſhip ſpoke his mind without ſuſpicion or reſerve, and an indictment and conviction of high treaſon was the conſequence. He was beheaded on Tower-hill, on the 22d of June 1535, in the 77th year of his age. Thus died this good old prelate; who, notwithſtanding his inflexible enmity to the reformation, was undoubtedly a learned, pious, and honeſt man. He wrote ſeveral treatiſes againſt Luther, and other works, which were printed at Wurtzburg, in 1597, in one volume folio.

FISHERY, a place where great numbers of fiſh are caught.

The principal fiſheries for ſalmon, herring, mackrel pilchards, &c. are along the coaſts of Scotland, England, and Ireland; for cod on the banks of Newfoundland; for whales, about Greenland: and for pearls in the Eaſt and Weſt Indies.

Free Fishery, in law, or an excluſive right of fiſhing in a public river, is a royal franchiſe; and is conſidered as ſuch in all countries where the feodal polity has prevailed: though the making ſuch grants, and by that means appropriating, what it ſeems unnatural to reſtrain the uſe of running water, was prohibited for the future by king John's Great Charter; and the rivers that were fenced in his time were directed to be laid open, as well as the foreſts to be disforeſted. This opening was extended by the ſecond and third charters of Henry III. to thoſe alſo that were fenced under Richard I.; ſo that a franchiſe of free fiſhery ought now to be as old at leaſt as the reign of Henry II. This differs from a *ſeveral of piſcary*, becauſe he that has a ſeveral fiſhery muſt alſo be the owner of the ſoil, which in a free fiſhery is not requiſite. It differs alſo from a *common* fiſhery, in that the free fiſhery is an excluſive right, the common fiſhery is not ſo: and therefore, in a free fiſhery a man has a property in the fiſh before they are caught; in a common piſcary, not till afterwards. Some indeed have conſidered a *free* fiſhery not as a royal franchiſe; but merely as a private grant of a liberty to fiſh in the *ſeveral* fiſhery of the granter. But the conſidering ſuch right as originally a flower of the prerogative, till reſtrained by Magna Charta, and derived by royal grant (previous to the reign of Richard I.) to ſuch as now claim it by preſcription, may remove ſome difficulties in reſpect to this matter with which our law-books are embarraſſed.

Black. Comment.

Fishery, denotes alſo the commerce of fiſh, more particularly the catching them for ſale.

“Were we to enter into a very minute and particular conſideration of fiſheries, as at preſent eſtabliſhed in Britain, this article would ſwell beyond its proper bounds; becauſe, to do juſtice to a ſubject of ſuch concernment to the Britiſh nation requires a very ample and diſtinct diſcuſſion. We ſhall, however, obſerve that ſince the Divine Providence hath ſo eminently ſtored the coaſts of Great Britain and Ireland with the moſt valuable fiſh; and ſince fiſheries, if ſucceſsful, become permanent nurſeries for breeding expert ſeamen; it is not only a duty we owe to the ſupreme Being, not to deſpiſe the wonderful plenty he hath afforded us, by neglecting to extend this branch of commerce to the utmoſt; but it is a duty we owe to our country, for its natural ſecurity, which depends upon the ſtrength of our royal navy. No nation can have a navy where there is not a fund of buſineſs to breed and employ ſeamen without any expence to the public; and no trade is ſo well calculated for training up theſe uſeful members of ſociety as fiſheries.

“The ſituation of the Britiſh coaſts is the moſt advantageous in the world for catching fiſh: the Scottiſh iſlands, particularly thoſe to the north and weſt, lie moſt commodious for carrying on the fiſhing trade to perfection: for no country in Europe can pretend to come up to Scotland in the abundance of the fineſt fiſh, with which its various creeks, bays, rivers, lakes, and coaſts are repleniſhed. Of theſe advantages the Scots ſeem indeed to have been abundantly ſenſible; and their traffic in herrings, the moſt valuable of all the fiſheries, is noticed in hiſtory ſo early as the ninth century*. The frequent laws which were enacted in the reigns of James III. IV. and V. diſcover a ſteady determined zeal for the benefit of the native ſubjects, and the full reſtoration of the fiſheries, which the Dutch had latterly found means to engroſs, and do honour to the memory of thoſe patriots whom modern times affect to call barbarians.

*See art. 4. *infra.*

“The expedition of James V. to the Hebrides and weſtern part of the Highlands, and his aſſiduity in exploring and ſounding the harbours, diſcovered a fixed reſolution in that active prince, to civilize the inhabitants, to promote the valuable fiſheries at their doors, and to introduce general induſtry. His death, at an early period, and the ſubſequent religious and civil commotions in the kingdom, fruſtrated thoſe wiſe deſigns, and the weſtern fiſheries remained in their original ſtate of neglect. At length, 1602, James VI. reſumed the national purpoſes which had been thus chalked out by his grandfather. “Three towns, (ſays Dr Robertſon) which might ſerve as a retreat for the induſtrious, and a nurſery for arts and commerce, were appointed to be built in different parts of the Highlands; one in Cantire, another in Lochaber, and a third in the iſle of Lewis; and in order to draw the inhabitants thither, all the privileges of the royal boroughs were to be conferred upon them. Finding it, however, to be no eaſy matter to inſpire the inhabitants of thoſe countries with the love of induſtry, a reſolution was taken to plant among them colonies of people from the more induſtrious countries. The firſt experiment was made in the iſle of Lewis; and as it was advantageouſly ſituated for the fiſhing trade (a ſource from which Scotland ought naturally to derive great wealth), the colony tranſported thither was drawn out by Fife, the inhabitants of which were well ſkilled in that branch of commerce. But before they had remained there long enough to manifeſt the good effects of this inſtitution, the iſlanders, enraged at ſeeing their country occupied by theſe intruders, took arms, and ſurpriſing them in the night-time, murdered ſome of them, and compelled the reſt to abandon the ſettlement. The king's attention being ſoon turned to other objects, particularly to his ſucceſſion to the Engliſh crown, we hear no more of this ſalutary project.”

“The Scottiſh fiſheries were, however, reſumed by Charles I. who “ordained an aſſociation of the three kingdoms, for a general fiſhing within the haill ſeas and coaſts of his majeſty's ſaid kingdoms; and for the government of the ſaid aſſociation, ordained, that there ſhould be a ſtanding committee choſen and nominated by his majeſty and his ſucceſſors from time to time," &c. &c. Several perſons of diſtinction embarked in the deſign, which the king honoured with his patronage, and encouraged by his bounty. He alſo ordered lent to be more ſtrictly obſerved ; prohibited the importation of fiſh taken by foreigners ; and agreed to purchaſe from the company his naval ſtores and the fiſh for his fleets. Thus the ſcheme of eſtabliſhing a fiſhery in the Hebrides began to aſſume a favourable aſpect ; but all the hopes of the adventurers were fruſtrated by the breaking out of the civil wars, and the very tragical death of their benefactor.

"In 1661, Charles II. duke of York, lord Clarendon, and other perſons of rank or fortune, reſumed the buſineſs of the fiſheries with greater vigour than any of their predeceſſors. For this purpoſe the moſt ſalutary laws were enacted by the parliaments of England and Scotland ; in virtue of which, all materials uſed in, or depending upon, the fiſheries, were exempted from all duties, exciſes, or impoſts whatever. In England, the company were authoriſed to ſet up a lottery, and to have a voluntary collection in all pariſh churches ; houſes of entertainment, as taverns, inns, ale-houſes, were to take one or more barrels of herrings, at the ſtated price of 30 s. per barrel ; alſo 2 s. 6 d. per barrel was to be paid to the ſtock of this company on all imported fiſh taken by foreigners. Some Dutch families were alſo invited or permitted, to ſettle at Stornaway : the herrings cured by the royal Engliſh company gave general ſatisfaction, and, as mentioned above, brought a high price for thoſe days. Every circumſtance attending this new eſtabliſhment ſeemed to be the reſult of a judicious plan and thorough knowledge of the buſineſs, when the neceſſities of the king obliged him to withdraw his ſubſcription or bounty ; which gave ſuch umbrage to the parties concerned, that they ſoon after diſſolved.

"In 1677, a new royal company was eſtabliſhed in England, at the head of which was the duke of York, the earl of Derby, &c. Beſides all the privileges which former companies had enjoyed, the king granted this new company a perpetuity, with power to purchaſe lands ; and alſo L. 20 to be paid them annually, out of the cuſtoms of the port of London, for every dogger or buſs they ſhould build and ſend out for ſeven years to come. A ſtock of L.10,980 was immediately advanced, and afterwards L. 1600 more. This ſmall capital was ſoon exhauſted in purchaſing and fiting out buſſes, with other incidental expences. The company made, however, a ſucceſsful beginning ; and one of their buſſes or doggers actually took and brought home 32,000 cod-fiſh ; other veſſels had alſo a favourable fiſhery. Such favourable beginnings might have excited freſh ſubſcriptions, when an unforeſeen event ruined the whole deſign beyond the poſſibility of recovery. Moſt of the buſſes had been built in Holland, and manned with Dutchmen ; on which pretence the French, who were then at war with Holland, ſeized ſix out of ſeven veſſels, with their cargoes and fiſhing-tackle ; and the company being now in debt, ſold, in 1680, the remaining ſtores, &c. A number of gentlemen and merchants raiſed a new ſubſcription of L. 60.000, under the privileges and immunities of the former charter. This attempt alſo came to nothing, owing to the death of the king, and the troubles of the ſubſequent reign.

"Soon after the revolution this buſineſs was again reſumed, and upon a more extenſive ſcale ; the propoſed capital being 300,000 l. of which 100,000 l. was to have been raiſed by the ſurviving patentees or their ſucceſſors, and 200,000 l. by new ſubſcribers. Copies of the letters patent, the conſtitution of the company, and terms of ſubſcription, were lodged at ſundry places in London and Weſtminſter, for the peruſal of the public, while the ſubſcription was filling. It is probable, that king William's partiality to the Dutch fiſheries, the ſucceeding war, or both of theſe circumſtances, fruſtrated this new attempt ; of which we have no further account in the annals of that reign or ſince.

"The Scottiſh parliament had alſo, during the three laſt reigns, paſſed ſundry acts for erecting companies and promoting the fiſheries ; but the inteſtine commotions of that country, and the great exertions which were made for the Darien eſtabliſhment, enfeebled all other attempts, whether collectively or by individuals, within that kingdom.

"In 1749, his late majeſty having, at the opening of the parliament, warmly recommended the improvement of the fiſheries, the houſe of commons appointed a committee to inquire into the ſtate of the herring and white fiſheries, and to conſider of the moſt probable means of extending the ſame. All ranks of men were elevated with an idea of the boundleſs riches that would flow into the kingdom from this ſource. A ſubſcription of 500,000 l. was immediately filled in the city, by a body of men who were incorporated for 21 years by the name of *The Society of the Free Britiſh Fiſhery*. Every encouragement was held out by government, both to the ſociety and to individuals, who might embark in this national buſineſs. A bounty of 36 s. *per* ton was to be paid annually out of the cuſtoms, for 14 years, to the owners of all decked veſſels or buſſes, from 20 to 80 tons burden, which ſhould be built after the commencement of the act, for the uſe of, and fitted out and employed in, the ſaid fiſheries, whether by the ſociety or any other perſons. At the ſame time numerous pamphlets and newſpaper-eſſays came forth ; all pretending to elucidate the ſubject, and to convince the public with what facility the herring fiſheries might be transferred from Dutch to Britiſh hands. This proved, however, a more arduous taſk than had been foreſeen by ſuperficial ſpeculators. The Dutch were frugal in their expenditures and living ; perfect maſter of the arts of fiſhing and curing, which they had carried to the greateſt height and perfection. They were in full poſſeſſion of the European markets ; and their fiſh, whether deſerving or otherwiſe, had the reputation of ſuperier qualities to all others taken in Britiſh ſeas. With ſuch advantages, the Dutch not only maintained their ground againſt this formidable company, but had alſo the pleaſure of ſeeing the capital gradually ſinking, without having procured an adequate return to the adventurers ; notwithſtanding various aids and efforts of government from time to time in their favour, particularly in 1757, when an advance of 20 s. *per* ton was added to the bounty.

"In 1786 the public attention was again called to the ſtate of the Britiſh fiſheries, by the ſuggeſtions of Mr Deſtemper in the houſe of commons, and by different publications that appeared upon the ſubject : in conſequence of which, the miniſter ſuffered a committee to be named, to inquire into this great ſource of national wealth. To that committee it appeared, that the beſt way of improving the fiſheries was to encourage the inhabitants living neareſt to the ſeat of them to become fiſhers: And it being found that the north-weſtern coaſt of the kingdom, though abounding with fiſh and with fine harbours, was utterly deſtitute of towns, and act was paſſed for incorporating certain perſons therein named, by the ſtyle of "*The Britiſh Society* for extending of the fiſheries and improving the ſea-coaſts of this kingdom;" and to enable them to ſubſcribe a joint ſtock, and therewith to purchaſe lands, and built thereon free towns, villages, and fiſhing ſtations in the Highlands and iſlands in that part of Great Britain called Scotland, and for other purpoſes. The Iſle of Mull, Loch-Broom, the Iſle of Sky and of Cannay, have already been pitched upon as proper ſituations for ſome of theſe towns. The progreſs of ſuch an undertaking from its nature muſt be ſlow, but ſtill ſlower when carried on with a limited capital ariſing from the ſubſcriptions of a few public-ſpirited individuals. But it is not to be doubted but that it will ultimately tend to the increaſe of the fiſheries, and to the improvement of the Highland part of that kingdom. Its tendency is alſo to leſſen the emigration of a brave and induſtrious race of inhabitants, many of whom have already removed with their families to America."

1. *Anchovy*-FISHERY. The anchovy is caught in the months of May, June, and July, on the coaſts of Catalonia, Provence, &c. at which ſeaſon it conſtantly repairs up the ſtraits of Gibraltar, into the Mediterranean. Collins ſays they are alſo found in plenty on the weſtern coaſts of England and Wales.

The fiſhing for them is chiefly in the night-time; when a light being put on the ſtern of their little fiſhing-veſſels, the anchovies flock round, and are caught in the nets. But then it is aſſerted to have been found by experience, that anchovies taken thus by fire, are neither ſo good, ſo firm, nor ſo proper for keeping, as thoſe which are taken without fire.

When the fiſhery is over, they cut off the heads, take out their gall and guts, and then lay them in barrels, and ſalt them. The common way of eating anchovies is with oil, vinegar, &c. in order to which they are firſt boned, and the tails, fins, &c. ſlipped off.—Being put on the fire, they diſſolve almoſt in any liquor. Or they are made into ſauce by mincing them with pepper, &c. Some alſo pickle anchovies in ſmall delft or earthern pots, made on purpoſe, of two or three pound weight, more or leſs, which they cover with plaſter to keep them the better. Anchovies ſhould be choſen ſmall, freſh pickled, white on the outſide and red within. They muſt have a round back; for thoſe which are flat or large are often nothing but ſardines. Beſide theſe qualities, the pickle, on opening the pots or barrels, muſt be of a good taſte, and not have loſt its flavour.

2. *Cod* FISHERY. There are two kinds of cod-fiſh; the one green or white cod, and the other dried or cured cod; though it is all the ſame fiſh*, differently prepared; the former being ſometimes ſalted and barrelled, then taken out for uſe; and the latter, having lain ſome competent time in ſalt, dried in the ſun or ſmoke. We ſhall therefore ſpeak of each of theſe apart; and firſt of the

* See *Gadus*.

Green. The chief fiſheries for green cod are in the bay of Canada, on the great bank of Newfoundland, and on the iſle of St Peter, and the iſle of Sable; to which places veſſels reſort from divers parts both of Europe and America. They are from 100 to 150 tons burden, and will catch between 30,000 and 40,000 cod each. The moſt eſſential part of the fiſhery is, to have a maſter who knows how to cut up the cod, one who is ſkilled to take off the head properly, and above all a good ſalter, on which the preſerving of them, and conſequently the ſucceſs of the voyage, depends. The beſt ſeaſon is from the beginning of February to the end of April: the fiſh, which in the winter retire to the deepeſt water, coming then on the banks, and fattening extremely. What is caught from March to June keeps well; but thoſe taken in July, Auguſt, and September, when it is warm on the banks, are apt to ſpoil ſoon. Every fiſher takes but one at a time: the moſt expert will take from 350 to 400 in a day; but that is the moſt, the weight of the fiſh and the great coldneſs on the bank fatiguing very much. As ſoon as the cod are caught, the head is taken off; they are opened, gutted, and ſalted; and the ſalter ſtows them in the bottom of the hold, head to tail, in beds a fathom or two ſquare; laying layers of ſalt and fiſh alternately, but never mixing fiſh caught on different days. When they have lain thus three or four days to drain of the water, they are replaced in another part of ſhip, and ſalted again; where they remain till the veſſel is loaded. Sometimes they are cut in thick pieces, and put in barrels for the conveniency of carriage.

Dry. The principal fiſhery for this article, is from Cape Roſe to the Bay des Exports, along the coaſt of Placentia, in which compaſs there are divers commodious ports for the fiſh to be dried in. Theſe, though of the ſame kind with the freſh cod, are much ſmaller, and therefore fitted to keep, as the ſalt penetrates more eaſily into them. The fiſhery of both is much alike; only this latter is moſt expenſive, as it takes up more time, and employs more hands, and yet ſcarce half ſo much ſalt is ſpent in this as in the other. The bait is herrings, of which great quantities are taken on the coſt of Placentia. When ſeveral veſſels meet and intend to fiſh in the ſame port, he whoſe ſhalop firſt touches ground, becomes intitled to the quality and privileges of admiral: he has the choice of his ſtation, and the refuſal of all the wood on the coaſt at his arrival. As faſt as the maſters arrive, they unrig all their veſſels, leaving nothing but the ſhrouds to ſuſtain the maſt; and in the mean time the mates provide a tent on ſhore, covered with branches of trees, and ſails over them, with a ſcaffold of great trunks of pines, 12, 15, 16, and often 20 feet high, commonly from 40 to 60 feet long, and about one-third as much in breadth. While the ſcaffold is preparing, the crew are a-fiſhing; and as faſt as they catch, they bring their fiſh aſhore, and open and ſalt them upon moveable benches; but the main ſalting is performed on the ſcaffold. When the fiſh have taken ſalt, they waſh and hang them to drain on rails; when drained, they are laid on kinds of ſtages, which are ſmall pieces of wood laid acroſs, and covered with branches of trees, having the leaves ſtripped off for the paſſage of the air. On theſe ſtages, there are diſpoſed, a fiſh thick, head againſt tail, with the back uppermoſt, and are turned carefully four times every 24 hours. When they begin to dry, they are laid in heaps 10 or 12 thick, in order to retain their warmth; and every day the heaps are enlarged, till they become double their firſt bulk; then two heaps are joined together, which they turn every day as before: laſtly, they are ſalted again, beginning with thoſe firſt ſalted; and being laid in huge piles, they remain in that ſituation till they are carried on board the ſhips, where they are laid on the branches of trees diſpoſed for that purpoſe, upon the ballaſt, and round the ſhip, with mats to prevent their contracting any moiſture.

There are four kinds of commodities drawn from cod, *viz.* the zounds, the tongues, the roes, and the oil extracted from the liver. The firſt is ſalted at the fiſhery, together with the fiſh, and put in barrels from 600 to 700 pound. The tongues are done in like manner, and brought in barrels from 400 to 500 pounds. The roes are alſo ſalted in barrels, and ſerve to caſt into the ſea to draw fiſh together, and particularly pilchards. The oil comes in barrels, from 400 to 520 pounds, and is uſed in dreſſing leather. In Scotland, they catch a ſmall kind of cod on the coaſts of Buchan, and all along the Murray frith on both ſides; as alſo in the frith of Forth, Clyde, &c. which is much eſteemed. They ſalt and dry them in the ſun upon rocks, and ſometimes in the chimney.

3. *Coral-Fishery.* See Coral.

4. *Herring-Fishery.* The great ſtations for this fiſhery are off the Shetland and Weſtern Iſles, and off the coaſt of Norfolk, in which the Dutch alſo ſhare*. There are two ſeaſons for fiſhing herring: the firſt from June to the end of Auguſt; and the ſecond in Autumn, when the fogs become very favourable for this kind of fiſhing. The Dutch begin their herring-fiſhing on the 24th of June, and employ a vaſt number of veſſels therein; called *buſſes*, being between 45 and 60 tons burden each, and carrying three or four ſmall cannon. They never ſtir out of port without a convoy, unleſs there be enough together to make about 18 or 20 cannon among them, in which caſe they are allowed to go in company. Before they go out, they make a verbal agreement, which has the ſame force as if it were in writing. The regulations of the admiralty of Holland are partly followed by the French and other nations, and partly improved and augmented with new ones; as, that no fiſher ſhall caſt his net within 100 fathoms of another boat: that while the nets are caſt, a light ſhall be kept on the hind-part of the veſſel, that when a boat is by any accident obliged to leave off fiſhing, the light ſhall be caſt into the ſea: that when the greater part of a fleet leaves off fiſhing, and caſts anchor, the reſt ſhall do the ſame, &c.

Mr Anderſon † gives to the Scots a knowledge of great antiquity in the herring-fiſhery. He ſays that the Netherlanders reſorted to theſe coaſts as early as A. D. 836, to purchaſe ſalted fiſh of the natives; but, impoſing on the ſtrangers, they learned the art, and took up the trade, in after-times of ſuch immenſe emolument to the Dutch.

Sir Walter Raleigh's obſervations on that head, extracted from the ſame author, are extremely worthy the attention of the curious, and excite reflections on the vaſt ſtrength reſulting from the wiſdom of well applied induſtry.

In 1603, he remarks the Dutch ſold to different nations, as many herrings as amounted to L. 1,759,000 Sterling. In the year 1615, they at once ſent out 2000 buſſes, and employed in them 37,000 fiſhermen. In the year 1618, they ſent out 3000 ſhips, with 50,000 men to take the herrings, and 9000 more ſhips to tranſport and ſell the fiſh; which by ſea and land employed 150,000 men, beſides thoſe firſt mentioned. All this wealth was gotten on the Scots coaſts; while their attention was taken up in a diſtant whale-fiſhery.

The Scottiſh monarchs for a long time ſeemed to direct all their attention to the preſervation of the ſalmon fiſhery; probably becauſe their ſubjects were ſuch novices in ſea-affairs. At length James III. endeavoured to ſtimulate his great men to theſe patriotic undertakings; for by an act of his third parliament, he compelled "certain lords ſpiritual and temporal, and burrows, to make ſhips, buſſes, and boats, with nets, and other pertinents for fiſhing. That the ſame ſhould be made in each burgh; in number according to the ſubſtance of each burgh, and the leaſt of them to be of twenty tons: and that all idle men be compelled by the ſheriffs in the country to go on board the ſame."

Numerous indeed have been the attempts made at different periods to ſecure this treaſure to themſelves, but without ſucceſs. In the late reign, a very ſtrong effort was made, and bounties allowed for the encouragement of Britiſh adventurers: the firſt was of 30s. *per* ton to every buſs of 70 tons and upwards. This bounty was afterwards raiſed to 50 s. *per* ton, to be paid to ſuch adventurers as were intitled to it by claiming it at the places of rendezvous. The buſſes are from 20 to 90 tons burden, but the beſt ſize is 80. A veſſel of 80 tons ought to take ten laſts, or 120 barrels of herrings, to clear expences, the price of the fiſh to be admitted to be a guinea a barrel. A ſhip of this ſize ought to have 18 men, and three boats: one of 20 tons ſhould have ſix men; and every five tons above, require an additional hand. To every ton are 280 yards of nets; ſo a veſſel of 80 tons carries 20,000 ſquare yards: each net is 12 yards long, and 10 deep; and every boat takes out from 20 to 30 nets, and puts them together, ſo as to form a long train; they are ſunk at each end of the train by a ſtone, which weighs it down to the whole extent: the top is ſupported by buoys, made of ſheep-ſkin, with a hollow ſtick at the mouth, faſtened tight; through this the ſkin is blown up, and then ſtopped with a peg, to prevent the eſcape of the air. Sometimes theſe buoys are placed at the top of the nets; at other times the nets are ſuffered to ſink deeper, by the lengthening the cords faſtened to them, every cord being for that purpoſe 10 or 12 fathoms long. But the beſt fiſheries are generally in more ſhallow water.

Of the Scots fiſhery in the Weſtern Iſles, the following account is given by Mr Pennant*. "The fiſhing is always performed in the night, unleſs by accident. The buſſes remain at anchor, and ſend out their boats a little before ſun-ſet; which continue out, in winter and ſummer, till day-light; often taking up and emptying their nets, which they do 10 or 12 times in a night, in caſe of good ſucceſs. During winter it is a moſt dangerous and fatiguing employ, by reaſon of the greatneſs and frequency of the gales in theſe ſeas, and in ſuch gales are the moſt ſucceſsful captures: but by the Providence of Heaven, the fiſhers are ſeldom loſt; and, what is wonderful,

* See the article *Clupea*.

† *Hiſt. of Commerce.*

* *Voyage to the Hebrides.*

derful, few are viſited with illneſs. They go out well prepared, with a warm great coat, boots, and ſkin aprons, and a good proviſion of beef and ſpirits. The ſame good fortune attends the buſſes, which in the tempeſtuous ſeaſon, and in the darkeſt nights, are continually ſhifting, in theſe narrow ſeas, from harbour to harbour. Sometimes 10 barrels of herrings are taken in a night by the boats of a ſingle veſſel. It once happened, in Loch-Slappan, in Skie, that a buſs of 80 tons might have taken 200 barrels in one night, with 10,000 ſquare yards of net; but the maſter was obliged to deſiſt for want of a ſufficient number of hands to preſerve the capture. The herrings are preſerved by ſalting, after the entrails are taken out. This laſt is an operation performed by the country people, who get three-halfpence per barrel for their trouble; and ſometimes, even in the winter, can gain fifteen pence a-day. This employs both women and children; but the ſalting is only entruſted to the crew of the buſſes. The fiſh are laid on their backs in the barrels, and layers of ſalt between them. The entrails are not loſt, for they are boiled into an oil: 8000 fiſh will yield ten gallons, valued at one ſhilling the gallon. A veſſel of 80 tons takes out 144 barrels of ſalt; a drawback of 2 s. 8 d. is allowed for each barrel uſed by the foreign or Iriſh exportation of the fiſh; but there is a duty of 1 s. per barrel for the home conſumption, and the ſame for thoſe ſent to Ireland. The barrels are made of oak-ſtaves, chiefly from Virginia, the hoops from ſeveral parts of Britain, and are either of oak, birch, hazel, or willow: the laſt from Holland, liable to a duty. The barrels coſt about 3 s. each, they hold from 500 to 800 fiſh, according to the ſize of the fiſh; and are made to contain 32 gallons. The barrels are inſpected by proper officers: a cooper examines if they are ſtatutable and good; if faulty he deſtroys them, and obliges the maker to ſtand to the loſs.

“ Loch-broom has been celebrated for three or four centuries as the reſort of herrings. They generally appear here in July; thoſe that turn into this bay are part of the brigade that detaches itſelf from the weſtern column of that great army which annually deſerts the vaſt depths of the arctic circle, and come, heaven-directed, to the ſeats of population, offered as a cheap food to millions, whom waſteful luxury or iron-hearted avarice hath deprived, by enhancing the price of the wonted ſupports of the poor. The migration of theſe fiſh from their northern retreat is regular; their viſits to the Weſtern iſles and coaſts, certain; but their attachment to one particular loch, extremely precarious. All have their turns: that which ſwarmed with fiſh one year, is totally deſerted the following; yet the next loch to it may be crowded with the ſhoals. Theſe changes of place give often full employ to the buſſes, who are continually ſhifting their harbour in queſt of news reſpecting theſe important wanderers. They commonly appear there in July; the latter end of Auguſt they go into deep water, and continue there for ſome time, without any apparent cauſe: in November, they return to the ſhallows, when a new fiſhery commences, which continues till January; at that time the herrings become full of roe, and are uſeleſs as articles of commerce. Some doubt, whether thoſe herrings that appear in November are not part of a new migration; for they are as fat, and make the ſame appearance, as thoſe that compoſed the firſt. The ſigns of the arrival of the herrings are flocks of gulls, who catch up the fiſh while they ſkim on the ſurface; and of gannets, who plunge and bring them up from conſiderable depths. Both theſe birds are cloſely attended to by the fiſhers. Cod-fiſh, haddocks, and dog-fiſh, follow the herrings in vaſt multitudes; theſe voracious fiſh keep on the outſide of the columns, and may be a concurrent reaſon of driving the ſhoals into bays and creeks. In ſummer, they come into the bays generally with the warmeſt weather, and with eaſy gales. During winter the hard gales from north-weſt are ſuppoſed to aſſiſt in forcing them into ſhelter. Eaſt winds are very unfavourable to the fiſhery.”

Herrings are cured either white or pickled, or red.

Of the *firſt*, thoſe done by the Dutch are the moſt eſteemed, being diſtinguiſhed into four ſorts, according to their ſizes; and the beſt are thoſe that are fat, fleſhy, firm, and white, ſalted the ſame day they are taken, with good ſalt, and well barrelled. The Britiſh cured herrings are little inferior, if not equal, to the Dutch; for in ſpite of all their endeavours to conceal the ſecret, their method of curing, laſting, or caſking the herrings, has been diſcovered, and is as follows. After they have hauled in their nets, which they drag in the ſtern of their veſſel backwards and forwards in traverſing the coaſt, they throw them upon the ſhip's deck, which is cleared of every thing for that purpoſe: the crew is ſeparated into ſundry diviſions, and each diviſion has a peculiar taſk; one part opens and guts the herrings, leaving the melts and roes; another cures and ſalts them, by lining or rubbing their inſide with ſalt; the next packs them, and between each row and diviſion they ſprinkle handfuls of ſalt; laſtly, the cooper puts the finiſhing hand to all, by heading the caſks very tight, and ſtowing them in the hold.

Red herrings muſt lie 24 hours in the brine, in as much as they are to take all their ſalt there; and when they are taken out, they are ſpitted, that is, ſtrung by the head on little wooden ſpits, and then hung in a chimney made for that purpoſe. After which, a fire of bruſh-wood, which yields a deal of ſmoke but no flame, being made under them, they remain there till ſufficiently ſmoked and dried, and are afterwards barrelled up for keeping.

5. *Lobſter*[*]-FISHERY. Lobſters are taken along the Britiſh channel, and on the coaſt of Norway, whence they are brought to London for ſale; and alſo in the frith of Edinburgh, and on the coaſt of Northumberland. By 10 and 11 W. III. cap. 24. no lobſter is to be taken under eight inches in length, from the peak of the noſe to the end of the middle fin of the tail; and by 9 Geo. II. cap. 33. no lobſters are to be taken on the coaſt of Scotland from the firſt of June to the firſt of September.

6. *Mackrel*[†]-FISHERY. The mackrel is a ſummer fiſh of paſſage, found in large ſhoals, in divers parts of the ocean, not far north; but eſpecially on the French and Engliſh coaſts. The fiſhing is uſually in the months of April, May, and June, and even July, according to the place. They enter the Engliſh channel

[*] See *Cancer*.

[†] See *Scomber*.

nel in April, and proceed up to the ſtraits of Dover as the ſummer advances; ſo that by June they are on the coaſts of Cornwall, Suſſex, Normandy, Picardy, &c. where the fiſhery is moſt conſiderable. They are an excellent food freſh; and not to be deſpiſed, when well prepared, pickled, and put up in barrels; a method of preſerved them chiefly uſed in Cornwall.

The fiſh is taken two ways; either with a line or nets: the latter is the more conſiderable, and is uſually performed in the night-time. The rules obſerved in the fiſhing for mackrel are much the ſame as thoſe already mentioned in the fiſhery of herrings.

There are two ways of pickling them: the firſt is, by opening and gutting them, and filling the belly with ſalt, crammed in as hard as poſſible with a ſtick; which done, they range them in ſtrata or rows, at the bottom of the veſſel, ſtrewing ſalt between the layers. In the ſecond way, they put them immediately into tubs full of brine, made of freſh water and ſalt; and leave them to ſteep, till they have imbibed ſalt enough to make them keep; after which, they are taken out, and barrelled up, taking care to preſs them cloſe down.

Mackrel are not cured or exported as merchandize from Britain, except a few by the Yarmouth and Leoſtoff merchants, but are generally conſumed at home; eſpecially in the city of London, and the ſea-ports between the Thames and Yarmouth, eaſt, and the Land's end of Cornwall, weſt.

7. *Oyſter* ‡-*Fishery*. This fiſhery, in Britain, is principally carried on at Colcheſter in Eſſex; Feverſham and Milton in Kent; the Iſle of Wight; the Swales of the Medway; and Tenby on the coaſt of Wales. From Feverſham, and adjacent parts, the Dutch have ſometimes loaded a hundred large hoys with oyſters in a year. They are alſo taken in great quantities near Portſmouth, and in all the creeks and rivers between Southampton and Chicheſter: many of which are carried about by ſea to London and to Colcheſter, to be fed in the pits about Wavenhoe and other places.

8. *Pearl-Fishery*. See Pearl.

9. *Pilchard-Fishery*. The chief pilchard fiſheries are along the coaſts of Dalmatia, on the coaſt of Bretagne, and along the coaſts of Cornwall and Devonſhire. That of Dalmatia is very plentiful: that on the coaſts of Bretagne employs annually about 300 ſhips. Of the pilchard fiſhery on the coaſt of Cornwall the following account is given by Dr Borlaſe: "It employs a great number of men on the ſea, training them thereby to naval affairs; employs men, women, and children, at land, in ſalting, preſſing, waſhing, and cleaning; in making boats, nets, ropes, caſks, and all the trades depending on their conſtruction and ſale. The poor are fed with the offals of the captures, the land with the refuſe of the fiſh and ſalt; the merchant finds the gains of commiſſion and honeſt commerce, the fiſherman the gains of the fiſh. Ships are often freighted hither with ſalt, and into foreign countries with the fiſh, carrying off at the ſame time part of their tin. The uſual produce of the great number of hogſheads exported each year for ten years from 1747 to 1756, incluſive, from the four ports of Fowey, Falmouth, Penzance, and St Ives, it appears that Fowey has exported yearly 1732 hogſheads; Falmouth, 14,631 hogſheads and two-thirds; Penzance and Mounts-Bay, 12,149 hogſheads and one third; St Ives, 1282 hogſheads: in all amounting to 29,795 hogſheads. Every hogſhead for ten years laſt paſt, together with the bounty allowed for each hogſhead exported, and the oil made out of each hogſhead, has amounted, one year with another at an average, to the price of 1 l. 13 s. 3 d.; ſo that the caſh paid for pilchards exported has, at a medium, annually amounted to the ſum of 49,532 l. 10 s."——The numbers that are taken at one ſhooting out of the nets are amazingly great. Mr Pennant ſays, that Dr Borlaſe aſſured him, that on the 5th of October, 1767, there were at one time incloſed in St Ives's Bay 7000 hogſheads, each hogſhead containing 35,000 fiſh, in all 245 millions.

The pilchards naturally follow the light, which contributes much to the facility of the fiſhery: the ſeaſon is from June to September. On the coaſts of France they make uſe of the roes of the cod-fiſh as a bait; which, thrown into the ſea, makes them riſe from the bottom, and run into the nets. On the Engliſh coaſts there are perſons poſted aſhore, who, ſpying by the colour of the water where the ſhoals are, make ſigns to the boats to go among them to caſt their nets. When taken, they are brought on ſhore to a warehouſe, where they are laid up in broad piles, ſupported with backs and ſides; and as they are piled, they ſalt them with bay-ſalt; in which lying to ſoak for 30 or 40 days, they run out a deal of blood, with dirty pickle and bittern: then they waſh them clean in ſea-water; and, when dry, barrel and preſs them hard down to ſqueeze out the oil, which iſſues out at a hole in the bottom of the caſk.

10. Salmon*-Fishery. The chief ſalmon fiſheries in Europe are in England, Scotland, and Ireland, in the rivers, and ſea-coaſts adjoining to the river-mouths. The moſt diſtinguiſhed for ſalmon in Scotland are, the river Tweed, the Clyde, the Tay, the Dee, the Don, the Spey, the Neſs, the Bewly, &c. in moſt of which it is very common, about the height of ſummer, eſpecially if the weather happens to be very hot, to catch four or five ſcore ſalmon at a draught. The chief rivers in England for ſalmon are, the Tyne, the Trent, the Severn, and the Thames. The fiſhing is performed with nets, and ſometimes with a kind of locks or weirs made on purpoſe, which in certain places have iron or wooden grates ſo diſpoſed, in an angle, that being impelled by any force in a contrary direction to the courſe of the river, they may give way and open a little at the point of contact, and immediately ſhut again, cloſing the angle. The ſalmon, therefore, coming up into the rivers, are admitted into theſe grates, which open, and ſuffer them to paſs through, but ſhut again, and prevent their return. The ſalmon is alſo caught with a ſpear, which they dart into him when they ſee him ſwimming near the ſurface of the water. It is cuſtomary likewiſe to catch them with a candle and lanthorn, or wiſp of ſtraw ſet on fire; for the fiſh naturally following the light are ſtruck with the ſpear, or taken in a net ſpread for that purpoſe, and lifted with a ſudden jerk from the bottom.

"The capture of ſalmon in the Tweed, about the month of July, (ſays Mr Pennant†) is prodigious. In a good fiſhery, often a boat-load, and ſometimes near two, are taken in a tide: ſome few years ago there was above

‡ See *Oſtrea*.

* See *Salmo*.

† *Brit. Zool.* iii. 289.

above 700 fiſh taken at one hawl, but from 50 to 100 is very frequent. The coopers in Berwick then begin to ſalt both ſalmon and gilſes in pipes and other large veſſels, and afterwards barrel them to ſend abroad, having then far more than the London markets can take off their hands.

" Moſt of the ſalmon taken before April, or to the ſetting in of the warm weather, is ſent freſh to London in baſkets; unleſs now and then the veſſel is diſappointed by contrary winds of ſailing immediately; in which caſe the fiſh is brought aſhore again to the coopers offices, and boiled, pickled, and kitted, and ſent to the London markets by the ſame ſhip, and freſh ſalmon put in the baſkets in lieu of the ſtale ones. At the beginning of the ſeaſon, when a ſhip is on the point of ſailing, a freſh clean ſalmon will ſell from a ſhilling to eighteen pence a pound; and moſt of the time that this part of the trade is carried on, the prices are from five to nine ſhillings per ſtone; the value riſing and falling according to the plenty of fiſh, or the proſpect of a fair or foul wind. Some fiſh are ſent in this manner to London the latter end of September, when the weather grows cool; but then the fiſh are full of large roes, grow very thin bellied, and are not eſteemed either palatable or wholeſome.

" The ſeaſon for fiſhing in the Tweed begins November 30th, but the fiſhermen work very little till after Chriſtmas: it ends on Michaelmas-day; yet the corporation of Berwick (who are conſervators of the river) indulge the fiſhermen with a fortnight paſt that time, on account of the change of the ſtyle.

" There are on the river 41 conſiderable fiſheries, extending upwards, about 14 miles from the mouth, (the others above being of no great value), which are rented for near 5400 l. *per annum*: the expence attending the ſervants wages, nets, boats, &c. amount to 5000 l. more; which together makes up the ſum 10,400 l. Now, in conſequence, the produce muſt defray all, and no leſs than 20 times that ſum of fiſh will effect it; ſo that 208,000 ſalmon muſt be caught there one year with another.

" Scotland poſſeſſes great numbers of fine fiſheries on both ſides of that kingdom. The Scotch in early times had moſt ſevere laws againſt the killing of this fiſh; for the third offence was made capital, by a law of James IV. Before that, the offender had power to redeem his life. They were thought in the time of Henry VI. a preſent worthy of a crowned head: for in that reign the queen of Scotland ſent to the ducheſs of Clarence 10 caſks of ſalted ſalmon; which Henry directed to paſs duty-free. The ſalmon are cured in the ſame manner as at Berwick, and a great quantity is ſent to London in the ſpring; but after that time, the adventurers began to barrel and export them to foreign countries: but we believe that commerce is far leſs lucrative than it was in former times, partly owing to the great increaſe of the Newfoundland fiſhery, and partly to the general relaxation of the diſcipline of abſtinence in the Romiſh church.

" Ireland (particularly the north) abounds with this fiſh: the moſt conſiderable fiſhery is at Cranna, on the river Ban, about a mile and a half from Coleraine. When I made the tour of that hoſpitable kingdom in 1754, it was rented by a neighbouring gentleman for L. 620 a-year; who aſſured me, that the tenant, his predeceſſor, gave L. 1600 *per annum*, and was a much greater gainer by the bargain, for the reaſons beforementioned, and on account of the number of poachers who deſtroy the fiſh in the fence-months.

" The mouth of this river faces the north; and is finely ſituated to receive the fiſh that roam along the coaſt in ſearch of an inlet into ſome freſh water, as they do all along that end of the kingdom which oppoſes itſelf to the northern ocean. We have ſeen near Ballicaſtle, nets placed in the ſea at the foot of the promontories that jut into it, which the ſalmon ſtrike into as they are wandering cloſe to ſhore; and numbers are taken by that method.

" In the Ban they fiſh with nets 18 ſcore yards long, and are continually drawing night and day the whole ſeaſon, which we think laſts about four months, two ſets of 16 men each alternately relieving one another. The beſt drawing is when the tide is coming in: we were told, that at a ſingle draught there were once 840 fiſh taken.

" A few miles higher up the river is a wear, where a conſiderable number of fiſh that eſcape the nets are taken. We were lately informed, that, in the year 1760, about 320 tons were taken in the Cranna fiſhery."

Curing Salmon. When the ſalmon are taken, they open them along the back, take out the guts and gills, and cut out the greateſt part of the bones, endeavouring to make the inſide as ſmooth as poſſible: they then ſalt the fiſh in large tubs for the purpoſe, where they lie a conſiderable time ſoaking in brine; and about October, they are packed cloſe up in barrels, and ſent to London, or exported up the Mediterranean. They have alſo in Scotland a great deal of ſalmon ſalted in the common way, which after ſoaking in brine a competent time, is well preſſed, and then dried in ſmoke: this is called *kipper*, and is chiefly made for home conſumption; and if properly cured and prepared, is reckoned very delicious.

Sturgeon Fishery.* The greateſt ſturgeon-fiſhery is in the mouth of the Volga, on the Caſpian ſea; where the Muſcovites employ a great number of hands, and catch them in a kind of incloſure formed by huge ſtakes repreſenting the letter Z repeated ſeveral times. Theſe fiſheries are open on the ſide next the ſea, and cloſe on the other; by which means the fiſh aſcending in its ſeaſon up the river, is embarraſſed in theſe narrow angular retreats, and ſo is eaſily killed with a harping-iron. Sturgeons, when freſh, eat deliciouſly; and in order to make them keep, they are ſalted or pickled in large pieces, and put up in kegs from 30 to 50 pounds. But the great object of this fiſhery is the roe, of which the Muſcovites are extremely fond, and of which is made the cavear, or kavia, ſo much eſteemed by the Italians. See CAVEAR.

Tunny-Fishery. The tunny (a ſpecies of SCOMBER, which ſee), was a fiſh well known to the ancients, and made a great article of commerce: And there are ſtill very conſiderable tunny-fiſheries on the coaſts of Sicily, as well as ſeveral other parts of the Mediterranean.

The nets are ſpread over a large ſpace of ſea by means of cables faſtened to anchors, and are divided into ſeveral compartments. The entrance is always directed, according to the ſeaſon, towards that part of the ſea from which the fiſh are known to come. A man

* See *Acipenſer*.

man placed upon the ſummit of a rock high above the water, gives the ſignal of the fiſh being arrived; for he can diſcern from that elevation what paſſes under the waters infinitely better than any perſon nearer the ſurface. As ſoon as notice is given that the ſhoal of fiſh has penetrated as far as the inner compartment, or the chamber of death, the paſſage is drawn cloſe, and the ſlaughter begins.

The undertakers of theſe fiſheries pay an acknowledgment to the king, or the lord upon whoſe land they fix the main ſtay or foot of the tonnara; they make the beſt bargain they can: and, till ſucceſs has crowned their endeavours, obtain this leave for a ſmall conſideration; but the rent is afterwards raiſed in proportion to their capture.

The tunny enters the Mediterranean about the vernal equinox, travelling in a triangular phalanx, ſo as to cut the waters with its point, and to preſent an extenſive baſe for the tides and currents to act againſt, and impel forwards. Theſe fiſh repair to the warm ſeas of Greece to ſpawn, ſteering their courſe thither along the European ſhores, but as they return, approach the African coaſt; the young fry is placed in the van of the ſquadron as they travel. They come back from the eaſt in May, and abound on the coaſt of Sicily and Calabria about that time. In autumn they ſteer northward, and frequent the neighbourhood of Amalfi and Naples; but during the whole ſeaſon ſtragglers are occaſionally caught.

When taken in May, the uſual time of their appearance in the Calabrian bays, they are full of ſpawn, and their fleſh is then eſteemed unwholeſome, apt to occaſion headachs and vapours; the milts and roes are particularly ſo at that ſeaſon. To prevent theſe bad effects, the natives fry them in oil, and afterwards ſalt them. The quantity of this fiſh conſumed annually in the two Sicilies almoſt exceeds the bounds of calcution. From the beginning of May to the end of October it is eaten freſh, and all the reſt of the year it is in uſe ſalted. The moſt delicate part is the muzzel. The belly ſalted was called *tarantallum*, and accounted a great delicacy by the Romans; its preſent name is *Surra*. The reſt of the body is cut into ſlices, and put into tubs.

Turbot-FISHERY. Turbots grow to a large ſize, ſome of them weighing from 23 to 30 pounds. They are taken chiefly off the north coaſt of England, and others off the Dutch coaſt. The large turbot (as well as ſeveral other kinds of flat fiſh) are taken by the hook and line, for they lie in deep water; the method of taking them in weirs or ſtaked nets being very precarious. When the fiſhermen go out to fiſh, each perſon is provided with three lines, which are coiled on a flat oblong piece of wicker-work; the hooks being baited, and placed regularly in the centre of the coil. Each line is furniſhed with 14 ſcore of hooks, at the diſtance of ſix feet two inches from each other. The hooks are faſtened to the lines upon ſneads of twiſted horſe-hair 27 inches in length. When fiſhing, there are always three men in each coble, and conſequently nine of theſe lines are faſtened together, and uſed as one line, extending in length near three miles, and furniſhed with 2520 hooks. An anchor and a buoy are fixed at the firſt end of the line, and one more of each at the end of each man's lines; in all four anchors, which are common perforated ſtones, and four buoys made of leather or cork. The line is always laid acroſs the current. The tides of flood and ebb continue an equal time upon the coaſt, and, when undiſturbed by winds, run each way about ſix hours; they are ſo rapid that the fiſhermen can only ſhoot and haul their lines at the turn of tide, and therefore the lines always remain upon the ground about ſix hours; during which time the *myxine glutinoſa* of Linnæus will frequently penetrate the fiſh that are on the hooks, and entirely devour them, leaving only the ſkin and bones. The ſame rapidity of tides prevents their uſing hand-lines; and therefore two of the people commonly wrap themſelves in the ſail, and ſleep while the other keeps a ſtrict look-out, for fear of being run down by ſhips, and to obſerve the weather. For ſtorms often riſe ſo ſuddenly, that it is with extreme difficulty they can ſometimes eſcape to the ſhore, leaving their lines behind.

Beſides the coble, the fiſhermen have alſo a five-men boat, which is 40 feet long and 15 broad, and 25 tons burden; it is ſo called, though navigated by ſix men and a boy, becauſe one of the men is commonly hired to cook, &c. and does not ſhare in the profits with the other five. This boat is decked at each end, but open in the middle, and has two large lug-ſails. All the able fiſhermen go in theſe boats to the herring-fiſhery at Yarmouth in the latter end of September, and return about the middle of November. The oatsare then laid up till the beginning of Lent, at which time they go off in them to the edge of the Dogger, and other places, to fiſh for turbot, cod, line, ſkates, &c. They always take two cobles on board; and when they come upon their ground, anchor the boat, throw out the cobles, and fiſh in the ſame manner as thoſe do who go from the ſhore in a coble; with this difference only, that here each man is provided with double the quantity of lines, and inſtead of waiting the return of the tide in the coble, return to their boat and bait their other lines; thus hawling one ſet and ſhooting another every turn of tide. They commonly run into harbour twice a week to deliver their fiſh.

The beſt bait is freſh herring cut in pieces of a proper ſize; the five-men boats are always furniſhed with nets for taking them. Next to herings are the leſſer lampreys. The next baits in eſteem are ſmall haddocks cut in pieces, ſand-worms, and limpets, here called *flidders*; and when none of theſe can be had, they uſe bullock's liver. The hooks are two inches and a half long in the ſhank, and near an inch wide between the ſhank and the point. The line is made of ſmall cording, and is always tanned before it is uſed.

Turbots are extremely delicate in their choice of baits; for if a piece of herring or haddock has been 12 hours out of the ſea, and then uſed as bait, they will not touch it.

*Whale** FISHERY. Whales are chiefly caught in the north ſeas: the largeſt ſort are found about Greenland or Spitzbergen. At the firſt diſcovery of this country, whales not being uſed to be diſturbed, frequently came into the very bays, and were accordingly killed almoſt cloſe to the ſhore; ſo that the blubber being cut off was immediately boiled into oil on the ſpot. The ſhips in thoſe times took in nothing but the pure oil and the whalebone, and all the buſineſs was executed

* See *Balæna*.

in the country; by which means a ſhip could bring home the product of many more whales than ſhe can according to the preſent method of conducting this trade. The fiſhery alſo was then ſo plentiful, that they were obliged ſometimes to ſend other ſhips to fetch off the oil they had made, the quantity being more than the fiſhing ſhips could bring away. But time and change of circumſtances have ſhifted the ſituation of this trade. The ſhips coming in ſuch numbers from Holland, Denmark, Hamburgh, and other northern countries, all intruders upon the Engliſh, who were the firſt diſcoverers of Greenland, the whales were diſturbed, and gradually, as other fiſh often do, forſaking the place, were not to be killed ſo near the ſhore as before; but are now found, and have been ſo ever ſince, in the openings and ſpace among the ice, where they have deep water, and where they go ſometimes a great many leagues from the ſhore.

The whale-fiſhery begins in May, and continues all June and July; but whether the ſhips have good or bad ſucceſs, they muſt come away, and get clear of the ice, by the end of Auguſt: ſo that in the month of September at fartheſt they may be expected home; but a ſhip that meets with a fortunate and early fiſhery in May may return in June or July.

The manner of taking whales at preſent is as follows.—Every ſhip is provided with ſix boats, to each of which belong ſix men for rowing the boat, and an harponeer, whoſe buſineſs is to ſtrike the whale with his harpoon. Two of theſe boats are kept conſtantly on the watch at ſome diſtance from the ſhip, faſtened to pieces of ice, and are relieved by others every four hours. As ſoon as a whale is perceived, both the boats ſet out in purſuit of it, and if either of them can come up before the whale finally deſcends, which is known by his throwing up his tail, the harpooner diſcharges his harpoon at him. There is no difficulty in chooſing the place where the whale is to be ſtruck, as ſome have aſſerted; for theſe creatures only come up to the ſurface in order to ſpout up the water, or *blow*, as the fiſhermen term it, and therefore always keep the ſoft and vulnerable part of their bodies above water. A late improvement was made in the method of diſcharging the harpoon; namely, by ſhooting it out of a kind of ſwivel or muſquetoon; but it doth not appear, that ſince this improvement was made, the whale-fiſhing ſhips have had better ſucceſs than before. —As ſoon as the whale is ſtruck, the men ſet up one of their oars in the middle of the boat as a ſignal to thoſe in the ſhip. On perceiving this, the watchman alarms all the reſt with the cry of *fall! fall!* upon which all the other boats are immediately ſent out to the aſſiſtance of the firſt.

The whale finding himſelf wounded, runs off with prodigious violence. Sometimes he deſcends perpendicularly; at others goes off horizontally, at a ſmall depth below the ſurface. The rope which is faſtened to the harpoon is about 200 fathoms long, and properly coiled up, that it may freely be given out as there is a demand for it. At firſt, the velocity with which this line runs over the ſide of the boat is ſo great, that it is wetted to prevent its taking fire: but in a ſhort time the ſtrength of the whale begins to fail, and the fiſhermen, inſtead of letting out more rope, ſtrive as much as poſſible to pull back what is given out already, though they always find themſelves neceſſitated to yield at laſt to the efforts of the animal, to prevent his ſinking their boat. If he runs out the 200 fathoms of line contained in one boat, that belonging to another is immediately faſtened to the end of the firſt, and ſo on; and there have been inſtances, where all the rope belonging to the ſix boats has been neceſſary, though half that quantity is ſeldom required. The whale cannot ſtay long below water, but again comes up to blow; and being now much fatigued and wounded, ſtays longer above water than uſual. This gives another boat time to come up with him, and he is again ſtruck with an harpoon. He again deſcends, but with leſs force than before; and when he comes up again, is generally incapable of deſcending, but ſuffers himſelf to be wounded and killed with long lances which the men are provided with for the purpoſe. He is known to be near death when he ſpouts up the water deeply tinged with blood.

The whale being dead, is laſhed along-ſide the ſhip. They then lay it on one ſide, and put two ropes, one at the head, and the other in the place of the tail, which, together with the fins, is ſtruck off as ſoon as he is taken, to keep theſe extremities above water. On the off-ſide of the whale are two boats, to receive the pieces of fat, utenſils, and men, that might otherwiſe fall into the water on that ſide. Theſe precautions being taken, three or four men with irons at their feet to prevent ſlipping, get on the whale, and begin to cut out pieces of about three feet thick and eight long, which are hauled up at the capſtane or windlaſs. When the fat is all got off, they cut off the whiſkers of the upper jaw with an ax. Before they cut, they are all laſhed to keep them firm; which alſo facilitates the cutting, and prevents them from falling into the ſea: when on board, five or ſix of them are bundled together, and properly ſtowed; and after all is got off, the carcaſe is turned a-drift, and devoured by the bears, who are very fond of it. In proportion as the large pieces of fat are cut off, the reſt of the crew are employed in ſlicing them ſmaller, and picking out all the lean. When this is prepared, they ſtow it under the deck, where it lies till the fat of all the whales is on board; then cutting it ſtill ſmaller, they put it up in tubs in the hold, cramming them very full and cloſe. Nothing now remains but to ſail homewards, where the fat is to be boiled and melted down into train-oil.

"It were in vain to ſpeak in this place of the advantages that may be derived to Great Britain from the whale-fiſhery. We ſhall only remark, that the legiſlature, juſtly conſidering that trade as of great national importance, beſtowed upon it at different periods very conſiderable encouragements. In particular, every Britiſh veſſel of 200 tons or upwards, bound to the Greenland ſeas on the whale-fiſhery, if found to be duly qualified according to the act, obtained a licence from the commiſſioners of the cuſtoms to proceed on ſuch voyage: and on the ſhip's return, the maſter and mate making oath that they proceeded on ſuch voyage and no other, and uſed all their endeavours to take whales, &c. and that all the whale-fins, blubber, oil, &c. imported in their ſhip, were taken by their crew in thoſe ſeas, there was allowed 40 s. for every ton according to the admeaſurement of the ſhip.

"It was afterwards found, however, that ſo great a bounty was neither neceſſary to the ſucceſs of the trade, nor expedient with regard to the public. In 1786, therefore the acts conferring the ſaid emoluments being upon the point of expiring, the ſubject was brought under the conſideration of parliament; and it was propoſed to continue the former meaſures, but with a reduction of the bounty from 40s. to 30 s. In propoſing this alteration, it was ſtated, "that the ſums which this country had paid in bounties for the Greenland fiſhery amounted to L.1,265,461; that, in the laſt year, we had paid L.94,658; and that, from the conſequent deduction of the price of the fiſh, the public at preſent paid 60 *per cent.* upon every cargo. In the Greenland fiſhery there were employed 6000 ſeamen, and theſe ſeamen coſt government L.13, 10s. per man *per annum*, though we were never able to obtain more than 500 of that number to ſerve on board our ſhips of war. Beſides, the vaſt encouragement given to the trade had occaſioned ſuch a glut in the market, that it was found neceſſary to export conſiderable quantities; and thus we paid a large ſhare of the purchaſe-money for foreign nations, as well as for our own people, beſides, ſupplying them with the materials of ſeveral important manufactures." This propoſition was oppoſed by ſeveral members, but was finally carried; and the propriety of the meaſure became very ſoon apparent. At that time (1786) the number of ſhips employed from England in the whale-fiſhery to Davis's Straits and the Greenland ſeas amounted to 139, beſides 15 from Scotland. The propoſed alteration took place the next year (1787); and notwithſtanding the diminution of the bounty, the trade increaſed; the number of ſhips employed the ſame year from England amounting to 217, and the next year (1788) to 222."

FISHGARD, or FISGARD a town of Pembrokeſhire, ſituated on a ſteep cliff on the ſea-ſhore, 264 miles from London, at the influx of the river Gwaine into the ſea, which here forms a ſpacious bay. It is governed by a mayor, a bailiff and other officers; and here veſſels may lie ſafely in five or ſix fathoms water. The inhabitants have a good trade in herrings, and annually cure, between Fiſgard and Newport, above 1000 barrels of them. The town ſends one member to parliament.

FISHING, in general the art of catching fiſh, whether by means of nets, or ſpears, or of the line and hook.

FISHING in the great, performed by the net, ſpear, or harpoon, for fiſh that go in ſhoals, has been explained in the preceding article. That performed by the rod, line, and hook, for ſolitary fiſh, is uſually termed ANGLING: See that article; and for the particular manner of angling for the different kinds of fiſh, ſee their reſpective names, as DACE, EEL, PERCH, &c. The following were omitted in their order.

1. The *Barbel*[*], (ſo called on account of the bark or beard that is under his chops), though a coarſe fiſh, gives conſiderable exerciſe to the angler's ingenuity. They ſwim together in great ſhoals, and are at their worſt in April, at which time they ſpawn, but come ſoon in ſeaſon: the places whither they chiefly reſort, are ſuch as are weedy and gravelly riſing grounds, in which this fiſh is ſaid to dig and and root with his noſe like a ſwine. In the ſummer he frequents the ſtrongeſt, ſwifteſt, currents of water; at deep bridges, wears, &c. and is apt to ſettle himſelf among the piles, hollow places, and moſs, or weeds; and will remain there immoveable; but in the winter he retires into deep waters, and helps the female to make a hole in the ſands to hide her ſpawn in, to hinder its being devoured by other fiſh. He is a very curious and cunning fiſh; for if his baits be not ſweet, clean, well ſcoured, and kept in ſweet moſs, he will not bite; but well-ordered and curiouſly kept, he will bite with great eagerneſs. The beſt bait for him is the ſpawn of a ſalmon, trout, or any other fiſh; and if you would have good ſport with him, bait the places where you intend to fiſh with it a night or two before, or with large worms cut in pieces; and the earlier in the morning or the later in the evening that you fiſh, the better it will be. Your rod and line muſt be both ſtrong and long, with a running plummet on the line; and let a little bit of lead be placed a foot or more above the hook, to keep the bullet from falling on it: ſo the worm will be at the bottom, where they always bite; and when the fiſh takes the bait, your plummet will lie and not choke him. By the bending of your rod you may know when he bites, as alſo with your hand you will feel him make a ſtrong ſnatch; then ſtrike, and you will rarely fail, if you play him well; but if you manage him not dexterouſly, he will break your line. The beſt time for fiſhing is about nine in the morning, and the moſt proper ſeaſon is the latter end of May, June, July, and the beginning of Auguſt.

Sportſ. Dict.

2. The *Bleak*[†], is an eager fiſh, caught with all ſorts of worms bred on trees or plants: as alſo with flies, paſte, ſheep's blood, &c. They may be angled for with half a ſcore of hooks at once, if they can be all faſtened on: he will alſo in the evening take a natural or artificial fly. If the day be warm and clear, there is no fly ſo good for him as the ſmall fly at the top of the water which he will take at any time of the day, eſpecially in the evening; but if the day is cold and cloudy, gentles and caddis are the beſt; about two feet under water. No fiſh yields better ſport to a young angler than the bleak. It is ſo eager, that it will leap out of the water for a bait.

There is another way of taking bleak, which is by whipping them in a boat, or on a bank-ſide in freſh water in a ſummer's evening, with a hazel top about five or ſix feet long and a line twice the length of the rod. But the beſt method is with a drabble, thus: Tie eight or ten ſmall hooks acroſs a line two inches above one another, the biggeſt hook the lowermoſt, (whereby you may ſometimes take a better fiſh), and bait them with gentles, flies, or ſome ſmall red worms, by which means you may take half a dozen or more at a time.

3. For the *Bream*[‡], obſerve the following directions, which will alſo be of uſe in carp-fiſhing. Procure about a quart of large red worms; put them into freſh moſs well waſhed and dried every three or four days, feeding them with fat mould and chopped fennel, and they will be thoroughly ſcoured in about three weeks.

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[*] See *Cyprinus*, 2.

[†] See *Cyprinus*, 9.

[‡] See *Cyprinus*, 51.

Let your lines be ſilk and hair, but all ſilk is the beſt: let the floats be either ſwan-quills or gooſe-quills. Let your plum be a piece of lead in the ſhape of a pear, with a ſmall ring at the little end of it: faſten the lead to the line, and the line-hook to the lead, about ten or twelve inches ſpace between lead and hook will be enough; and take care the lead be heavy enough to ſink the float. Having baited your hook well with a ſtrong worm, the worm will draw the hook up and down in the bottom, which will provoke the bream to bite the more eagerly. It will be beſt to fit up three or four rods and lines in this manner, and ſet them as will be directed, and this will afford you much the better ſport. Find the exact depth of the water if poſſible, that your float may ſwim on its ſurface directly over the lead; then provide the following ground bait: take about a peck of ſweet groſs-ground-malt; and having boiled it a very little, ſtrain it hard through a bag, and carry it to the water-ſide where you have ſounded; and in the place where you ſuppoſe the fiſh frequent, there throw in the malt by handfuls ſqueezed hard together, that the ſtream may not ſeparate it before it comes to the bottom: and be ſure to throw it in at leaſt a yard above the place where you intend the hook ſhall lie, otherwiſe the ſtream will carry it down too far. Do this about nine o'clock at night, keeping ſome of the malt in the bag, and go to the place about three the next morning: but approach very warily, leſt you ſhould be ſeen by the fiſh; for it is certain that they have their centinels watching on the top of the water while the reſt are feeding below. Having baited your hook ſo that the worm may crawl to and fro, the better to allure the fiſh to bite, caſt it in the place where you find the fiſh to ſtay moſt, which is generally in the broadeſt and deepeſt part of the river, and ſo that it may reſt about the midſt of your bait that is on the ground. Caſt in your ſecond line ſo that it may reſt a yard above that, and a third about a yard below it. Let your roads lie on the bank with ſome ſtones to keep them down at the great ends; and then withdraw yourſelf, yet not ſo far but that you can have your eye upon all the floats: and when you ſee one bitten and carried away, do not be too haſty to run in, but give time to the fiſh to tire himſelf, and then touch him gently. When you perceive the float ſink, creep to the water-ſide, and give it as much line as you can. If it is a bream or carp, they will run to the other ſide; which ſtrike gently, and hold your rod at a bent a little while; but do not pull, for then you will ſpoil all; but you muſt firſt tire them before they can be landed, for they are very ſhy. If there are any carps in the river, it is an even wager that you take one or more of them: but if there are any pike or perch, they will be ſure to viſit the ground-bait, though they will not touch it, being drawn thither by the great reſort of the ſmall fiſh; until you remove them, it is in vain to think of taking the bream or carp. In this caſe, bait one of your hooks with a ſmall bleak roach, or gudgeon, about two feet deep from your float, with a little red worm at the point of your hook; and if a pike be there he will be ſure to ſnap at it. This ſport is good till nine o'clock in the morning; and, in a gloomy day, till night: but do not frequent the place too much, leſt the fiſh grow ſhy.

Sportſ. Dict.

4. The *carp* *. A perſon who angles for carp muſt arm himſelf with abundance of patience, becauſe of its extraordinary ſubtilty and policy: they always chooſe to lie in the deepeſt places either of ponds or rivers, where there is but a ſmall running ſtream.

* See *Carp* & *Cyprinus*.

Further, obſerve, that they will ſeldom bite in cold weather; and you cannot be too early or too late at the ſport in hot weather: and if he bite you need not fear his hold; for he is one of thoſe leather-mouthed fiſh that have their teeth in their throat.

Neither muſt you forget, in angling for him, to have a ſtrong rod and line; and ſince he is ſo very wary it will be proper to entice him, by baiting the ground with a coarſe paſte.

He ſeldom refuſes the red worm in March, the caddis in June, nor the graſshopper in June, April, and September.

This fiſh does not only delight in worms, but alſo in ſweet paſte; of which there is great variety; the beſt is made of honey and ſugar, and ought to be thrown in the water ſome hours before you begin to angle; neither will ſmall pellets thrown into the water two or three days before be worſe for this purpoſe, eſpecially if chickens guts, garbage, or blood mixed with bran and cow-dung, be alſo thrown in.

But more particularly as to paſte very proper for this uſe, you may make it in the manner following: Take a ſufficient quantity of flour, and mingle it with veal, cut ſmall, making it up with a compound honey; then pound all together in a mortar till they are ſo tough as to hang upon the hook without waſhing off. In order to effect which the better, mingle whitiſh wool with it: and if you keep it all the year round, add ſome virgin wax and clarified honey.

Again, if you fiſh with gentles, anoint them with honey, and put them on your hook, with a deep ſcarlet dipped in the like, which is a good way to deceive the fiſh.

Honey and crumbs of wheat-bread, mixed together, make alſo a very good paſte.

In taking a carp either in pond or river, if the angler intends to add profit to his pleaſure, he muſt take a peck of ale-grains, and a good quantity of any blood to mix with the grains, baiting the ground with it where he intends to angle. This food will wonderfully attract the ſcale-fiſh, as carp, tench, roach, dace, and bream.

Let him angle in a morning, plumbing his ground, and angling for carp with a ſtrong line: the bait muſt be either paſte or a knotted red worm; and by this means he will have ſport enough.

Deſcription of the proper Baits for the ſeveral ſorts of FISH *referred to in the annexed Table.*

Flies.] 1. Stone-fly, found under hollow ſtones at the ſide of rivers, is of a brown colour, with yellow ſtreaks on the back and belly, has large wings, and is in ſeaſon from April to July. 2. Green drake, found among ſtones by river-ſides, has a yellow body ribbed with green, is long and ſlender, with wings like a butterfly, his tail turns on his back, and from May to Midſummer is very good. 3. Oak-fly, found in the body of an old oak or aſh, with its head downwards, is of a brown colour, and excellent from May to September. 4. Palmer-fly or worm, found on the leaves of plants, is commonly called a *caterpillar*, and when it comes to a fly is excellent for trout. 5. Ant-fly, found in ant-hills from June to September. 6. The May-fly is to be found playing at the river-ſide, eſpecially againſt rain. 7. The black-fly is to be found upon every hawthorn after the buds are come off.

Paſtes.] 1. Take the blood of ſheeps-hearts, and mix it with honey and flour worked to a proper conſiſtence. 2. Take old cheeſe grated, a little butter ſufficient to work it, and colour it with ſaffron: in winter uſe ruſty bacon inſtead of butter. 3. Crumbs of bread chewed or worked with honey or ſugar, moiſtened with gum-ivy water. 4. Bread chewed, and worked in the hand till ſtiff.

Worms.] 1. The earth-bob, found in ſandy ground after ploughing, it is white, with a red head, and bigger than a gentle: another is found in heathy ground, with a blue head. Keep them in an earthen veſſel well covered, and a ſufficient quantity of the mould they harbour in. They are excellent from April to November. 2. Gentles, to be had from putrid fleſh: let them lie in wheat-bran a few days before uſed. 3. Flag-worms, found in the roots of flags; they are of a pale yellow colour, are longer and thicker than a gentle, and muſt be ſcowred like them. 4. Cow-turd-bob, or clap-bait, found under a cow-turd from May to Michaelmas; it is like a gentle, but larger. Keep it in its native earth like the earth-bob. 5. Cadis worm, or cod-bait, found under looſe ſtones in ſhallow rivers; they are yellow, bigger than a gentle, with a black or blue head, and are in ſeaſon from April to July. Keep them in flannel bags. 6. Lob-worm, found in gardens; it is very large, and has a red head, a ſtreak down the back, and a flat broad-tail. 7. Marſh-worms, found in marſhy ground; keep them in moſs ten days before you uſe them: their colour is a bluiſh red, and are good bait from March to Michaelmas. 8. Brandling red-worms, or blood-worms found in rotten dunghills and tanners bark; they are ſmall red-worms, very good for all ſmall fiſh, have ſometimes a yellow tail, and are called *tag-tail*.

Fiſh and Inſects.] 1. Minnow. 2. Gudgeon. 3. Roach. 4. Dace. 5. Smelt. 6. Yellow frog. 7. Snail ſlit. 8. Graſhopper.

Fishing-Fly, a bait uſed in angling for divers kinds of fiſh. See Fishing.

The fly is either *natural* or *artificial*.

I. *Natural* flies are innumerable. The more uſual for this purpoſe are mentioned in the preceding page.

There are two ways to fiſh with natural flies; either on the ſurface of the water or a little underneath it.

In angling for chevin, roach, or dace, move not your natural fly ſwiftly, when you ſee the fiſh make at it; but rather let it glide freely towards him with the ſtream: but if it be in a ſtill and ſlow water, draw the fly ſlowly ſidewiſe by him, which will make him eagerly purſue.

II. The *artificial* fly is ſeldom uſed but in bluſtering weather, when the waters are ſo troubled by the winds, that the natural fly cannot be ſeen, nor reſt upon them. Of this artificial fly there are reckoned no leſs than 12 ſorts, of which the following are the prinpal.

1. For March, the dun-fly; made of dun-wool, and the feathers of the partridge's wing; or the body made of black wool, and feathers of a black drake. 2. For April, the ſtone-fly; the body made of black wool, dyed yellow under the wings and tail. 3. For the beginning of May, the ruddy fly; made of red wool, and bound about with black-ſilk, with the feathers of a black capon hanging dangling on his ſides next his tail. 4. For June, the greeniſh fly; the body made of black wool, with a yellow liſt on either ſide, the wings taken off the wings of a buzzard, bound with black broken hemp. 5. The Mooriſh fly, the body made of duſkiſh wool, and the wings of the blackiſh mail of a drake. 6. The tawny fly, good till the middle of June; the body made of tawny wool, the wings made contrary one againſt the other, of the whitiſh mail of a white drake. 7. For July, the waſp-fly; the body made of black wool, caſt about with yellow ſilk, and the wings of drakes feather. 8. The ſteel-fly, good in the middle of July: the body made with greeniſh wool, caſt about with the feathers of a peacock's tail, and the wings made of thoſe of the buzzard. 9. For Auguſt, the drake-fly; the body made with black wool caſt about with black ſilk; his wings of the mail of a black drake, with a black head.

The beſt rules for artificial fly-fiſhing are,

1. To fiſh in a river ſomewhat diſturbed with rain: or in a cloudy day, when the waters are moved by a gentle breeze: the ſouth wind is beſt; and if the wind blow high, yet not ſo but that you may conveniently guard your tackle, the fiſh will riſe in plain deeps; but if the wind be ſmall, the beſt angling is in ſwift ſtreams. 2. Keep as far from the water-ſide as may be; fiſh down the ſtream with the ſun at your back, and touch not the water with your line. Ever angle in clear rivers, with a ſmall fly and ſlender wings; but in muddy places, uſe a larger. 4. When, after rain, the water becomes browniſh, uſe an orange fly; in a clear day, a light-coloured fly; a dark fly for dark waters, &c. 5. Let the line be twice as long as the rod, unleſs the river be encumbered with wood. 6. For every ſort of fly, have ſeveral of the ſame, differing in colour, to ſuit with the different complexions of ſeveral waters and weathers. 7. Have a nimble eye, and active hand, to ſtrike preſently with the riſing of the fiſh; or elſe he will be apt to ſpue out the hook. 8. Let the fly fall firſt into the water, and not the line, which will ſcare the fiſh. 9. In ſlow rivers, or ſtill places, caſt the fly acroſs the river, and let it ſink a little in the water, and draw it gently back with the current.

Salmon-flies ſhould be made with their wings ſtanding one behind the other, whether two or four. This fiſh delights in the gaudieſt colours that can be; chiefly in the wings, which muſt be long as well as the tail.

Fishing by means of birds, a method peculiar to the Chineſe, who train certain birds for the purpoſe in the ſame manner as falcons are taught to purſue game. See Cyprinus; and China, n° 121.

Fishing-Floats, are little appendages to the line, ſerving to keep the hook and bait ſuſpended at the proper depth, to diſcover when the fiſh has hold of them, &c. Of theſe there are divers kinds; ſome

An Epitome of the whole art of Fishing, wherein is ſhewn (at one view), the harbours, ſeaſons, and depths, for catching all ſorts of fiſh uſually angled for; alſo the various baits for each, ſo digeſted as to contain the eſſence of all the treatiſes ever written on the ſubject, exempt from the ſuperfluities, which tend more to perplex than inſtruct.

Names.	Where found.	Seaſon.	Time to ang.	Depth from ground.	Proper Baits.			
					Flies. N°	Paſtes. N°	Worms. N°	Fiſh and Inſects. N° 8
Bream	rough ſtr. river or mid. pond	April to Mich.	Sun-riſe to 9 3 to Sun-ſet	touch ground	——	1 3	1 to 7	
Barbel	gravel-banks in currents under bridges	April to Aug.	very early or late	ditto	——	2	2 6 7	——
Bleak	ſandy bottom, deep rivers ſhips ſterns	May to Oct.	all day	6 inches from bottom	1 2	2	2 3 8	——
Carp	ſtill deep mud-bottom, pond or river	May to Aug.	Sun-riſe to 9 3 to Sun-ſet	3 inches from bottom hot weather, mid-water	——	1 3 4	1 2 3 4 7	——
Chub or Chevin	ditto	May to Dec.	ditto	ditto	1 to 5	2	1 2 4 5	7 8
Dace	ſandy bottom, deep rivers, ſhips ſterns	May to Oct.	all day	6 to 12 inches from bottom	ditto	3 4	1 to 5 & 8	——
Gudgeon	gravel ſhoals	May to Oct.	ditto	near or on ground	——	ditto	2 8	——
Pike	near clay banks	All the year.	ditto	mid-water	wh. ſtro. and ſnap	line float hook fixt	on ſhore	1 2 3 4 5 6 7
Perch	river in ſtream } gravel or weedy bottom	May to Aug.	S.-riſe to 10 2 to Sun-ſet	ditto	2	1	3 5 7 8	1 6
	pond deepeſt part } gravel or weedy bottom	Aug. to May.	mid-day	6 inches from bottom				
Pope	deep holes in rivers	May to Oct.	all day	ditto	5	——	all	——
Roach	ſandy bottom, deep rivers, ſhips ſterns	May to Oct.	ditto	6 to 12 inches	1 2 4 5	3 4	ditto	8
Salmon	deep rivers	March to Sept.	8 to 9, 3 to 6	mid-way to the bottom	all large	——	1 5 6 7	1
Smelts	ſhips ſterns and docks	Apr. to Oct.	all day	mid-way to the bottom variable	all ſmall	——	1 2 5	bits of ſmelts
Trout	purling ſtreams and eddies of ſtony bottom river	Mar. to Mich.	ditto	cold weather, 6 inches to 9 hot weath. top to mid-wat.	1 to 5	——	1 2 5 to 8	1 8
Tench	mud-bottom river or pond	All the year.	Sun-riſe to 9 3 to Sun-ſet	cold wea. 3 inch. from bot. hot weather mid-water	——	1 3 4	1 3 4 to 7	——
Umber or Grayling	clay bottom, ſwift ſtream	All the year.	all day	cold weather, 6 to 9 inches hot weath. top to mid-wat.	1 to 5	——	all	1 8

Sportſ. Dict.

made of Muſcovy-duck quills, which are the beſt for ſlow waters; but for ſtrong ſtreams, ſound cork, without flaws or holes, bored through with an hot iron, into which is put a quill of a fit proportion, is preferable: pare the cork to a pyramidal form, and make it ſmooth.

Fishing-Hook, a ſmall inſtrument made of ſteel-wire, of a proper form to catch and retain fiſh.

The fiſhing hook, in general, ought to be long in the ſhank, ſomewhat thick in the circumference, the point even and ſtraight; let the bending be in the ſhank.

For ſetting the hook on, uſe ſtrong, but ſmall ſilk, laying the hair on the inſide of your hook; for if it be on the outſide, the ſilk will fret and cut it aſunder.

There are ſeveral ſizes of theſe fiſhing-hooks, ſome big, ſome little: and of theſe, ſome have peculiar names; as, 1. Single hooks. 2. Double hooks; which have two bendings, one contrary to the other. 3. Snappers, or gorgers, which are the hooks to whip the artificial fly upon, or bait with the natural fly. 4. Springers, or ſpring hooks; a kind of double hooks, with a ſpring, which flies open upon being ſtruck into any fiſh, and ſo keep its mouth open.

Fishing-Line, is either made of hair twiſted: or ſilk; or the Indian graſs. The beſt colours are the ſorrel, white, and grey; the two laſt for clear waters, the firſt for muddy ones. Nor is the pale watery green deſpiſable; this colour is given artificially, by ſteeping the hair in a liquor made of alum, ſoot, and the juice of walnut-leaves, boiled together.

Fishing-Rod, a long ſlender rod, or wand, to which the line is faſtened, for angling.—Of theſe there are ſeveral ſorts; as, 1. A troller, or trolling-rod, which has a ring at the end of the rod, for the line to go through when it runs off a reel. 2. A whipper, or whipping-rod; a top-rod, that is weak in the middle, and top heavy, but all ſlender and fine. 3. A dropper; which is a ſtrong rod and very light. 4. A ſnapper, or ſnap-rod; which is a ſtrong pole, peculiarly uſed for the pike. 5. A bottom-rod; being the ſame as the dropper, but ſomewhat more pliable. 6. A ſniggling or procking-ſtick; a forked ſtick, having a ſhort ſtrong line, with a needle, baited with a lobe worm: this is only for eels in their holes.

Fishing-Frog, or *Angler*. See Lophius.

Right of Fishing, and property of fiſh. It has been held, that where the lord of the manor hath the ſoil on both ſides of the river, it is a good evidence that he hath a right of fiſhing; and it puts the proof upon him who claims *liberam piſcariam:* but where a river ebbs and flows, and is an arm of the ſea, there it is common to all, and he who claims a privilege to himſelf muſt prove it; for if the treſpaſs is brought for fiſhing there, the defendant may juſtify, that the place where is *brachium maris, in quo unuſquiſque ſubditus domini regis habet et habere debet liberam piſcariam.* In the Severn the ſoil belongs to the owners of the land on each ſide; and the ſoil of the river Thames is in the king, but the fiſhing is common to all. He who is owner of the ſoil of a private river, hath *ſeparalis piſcaria;* and he that hath *libera piſcaria,* hath a property in the fiſh, and may bring a poſſeſſory action for them; but *communis piſcaria* is like the caſe of all other commons. One that has a cloſe pond in which there are fiſh, may call them *piſces ſuos,* in an indictment, &c. but he cannot call them *bona & catalla,* if they be not in trunks. There needs no privilege to make a fiſh-pond, as there doth in the caſe of a warren. See Franchise.

Jacob's Law Dict.

FISSURES, in the hiſtory of the earth, certain interruptions, that in an horizontal or parallel manner divide the ſeveral ſtrata of which the body of our terreſtrial globe is compoſed.

Fissure of the Bones, in ſurgery, is when they are divided either tranſverſely or longitudinally, not quite through, but cracked after the manner of glaſs, by any external force. See Surgery.

FISTULA, in the ancient muſic, an inſtrument of the wind-kind, reſembling our flute or flageolet.

The principal wind-inſtruments of the ancients, were the tibia and the fiſtula. But how they were conſtituted, wherein they differed, or how they were played upon, does not appear. All we know is, that the fiſtula was at firſt made of reeds, and afterwards of other matters. Some had holes, ſome none; ſome again were ſingle pipes; others a combination of ſeveral; witneſs the ſyringa of Pan.

Fistula, in ſurgery, a deep, narrow, and callous ulcer, generally ariſing from abſceſſes.

It differs from a *ſinus*, in its being callous, the latter not. See Surgery.

Fistula, in farriery. See Farriery, Sect. xxxii.

FISTULARIA, or Tobacco-pipe Fish; a genus of fiſhes belonging to the order of abdominales. Of this genus, Linnæus reckons two ſpecies; but we have a deſcription only of one, viz. the tabacaria. It is deſcribed by Mr Cateſby, from the only one he ever ſaw. It was almoſt a foot in length; the fore-part from the noſe to half-way the body of nearly equal bigneſs; from whence it grew tapering to the tail, which was forked, and from which grew a ſlender taper whip, four inches long, of the conſiſtence of whalebone; the mouth narrow, from which to the eyes was almoſt three inches. The whole fiſh was of a brown colour. They are ſometimes taken on the coaſts of Jamaica.

Plate CXCVI.

FIT. See Paroxysm.

Dr Cheyne is of opinion, that fits of all kinds, whether epileptic, hyſteric, or apoplectic, may be cured ſolely by a milk-diet, of about two quarts of cows-milk a-day, without any other medicine.

FITCHES, in huſbandry, a ſort of pulſe, more generally known by the name of *chick-pea*. See Cicer.

Fitches are cultivated either for feeding cattle, or improving the land. They make a wholeſome and nouriſhing food, whether given in the ſtraw or threſhed out. When ſown only to improve the ſoil, they are plowed in juſt as they begin to bloſſom, by which means a tough ſtiff clay-ſoil is much enriched.

FITCHET, a name uſed in ſome places for the weaſel, called alſo the *foumart*. See Mustela.

FITCHY, in heraldry, (from the French *fiſhé*, i. e. *fixed*); a term applied to a croſs when the lower branch ends in a ſharp point: and the reaſon of it Mackenzie ſuppoſes to be, that the primitive Chriſtians were wont to carry croſſes with them wherever they went; and when they ſtopped on their journey at any place, they fixed thoſe portable croſſes in the ground for devotion's ſake.

FITZ, makes part of the ſurname of ſome of the natural ſons of the kings of England, as *Fitz-roy;* which is purely French, and ſignifies the "king's ſon."

FITZHERBERT (Sir Anthony), a very learned lawyer in the reign of king Henry VIII. was deſcended from an ancient family, and born at Norbury in Derbyſhire. He was made one of the judges of the court of common pleas in 1523; and diſtinguiſhed himſelf by many valuable works, as well as by ſuch an honourable diſcharge of the duties of his office, as made him eſteemed an oracle of the law. His writings are, *The Grand Abridgment; The Office and Authority of Juſtices of Peace; the Office of Sheriffs, Bailiffs of Liberties, Eſcheators, Conſtables, Coroners,* &c.; *Of the Diverſity of*

Courts; *The New Natura Brevium*; *Of the Surveying of Lands*; and *The Book of Huſbandry*. He died in 1538.

FITZ-STEPHEN (William), a learned monk of Canterbury, of Norman extraction, but born of reſpectable parents in the city of London. He lived in the 12th century; and being attached to the ſervice of archbiſhop Becket, was preſent at the time of his murder. In the year 1174, he wrote in Latin, *The Life of St Thomas, archbiſhop and martyr*; in which, as Becket was a native of the metropolis, he introduces a deſcription of the city of London, with a miſcellaneous detail of the manners and uſages of the citizens: this is deſervedly conſidered as a great curioſity, being the earlieſt profeſſed account of London extant. Fitz-Stephen died in 1191.

FIVES, or VIVES. See FARRIERY, Sect. xiv. 2.

FIXATION, in chemiſtry, the rendering any volatile ſubſtance fixed, ſo as not to fly off upon being expoſed to a great heat: hence,

FIXED BODIES, are thoſe which bear a conſiderable degree of heat without evaporating, or loſing any of their weight. Among the moſt fixed bodies are diamonds, gold, &c. See DIAMOND, GOLD, &c.

FIXED, or *Fixable Air*, an inviſible and permanently elaſtic fluid, ſuperior in gravity to the common atmoſpheric air and moſt other aerial fluids, exceedingly deſtructive to animal life; produced in great quantities, naturally from combuſtible bodies, and artificially by many chemical proceſſes. From its apparently acid properties it has obtained the name of *aerial acid*, *cretaceous acid*, and *carbonic acid*; from its noxious qualities, it has been called *mephitic air*, or *mephitic gas*; and, from the circumſtance of being produced in vaſt quantities during the combuſtion of charcoal, it firſt obtained from Van Helmot the name of *gas ſylveſtre*. The term *fixed air* has been given from its property of readily loſing its elaſticity, and fixing itſelf in many bodies, particularly thoſe of the calcareous kind; and though ſome objected to the propriety of the term, the fluid in queſtion is ſo well known by the name of fixed air, that we chooſe ſtill to retain it.

1
Mr Delaval's theory of fixed air.

The nature and properties of fixed air are explained under the article AEROLOGY. It is there conſidered as an acid, and the reaſons for ſuppoſing it to be compoſed of phlogiſton and dephlogiſticated are ſet forth. In a paper of the Mancheſter Tranſactions by Mr Delaval on the permanent colours of opaque bodies, he conſiders the nature of fixed air, and gives an account ſomewhat different. He denies its acid property, which has been generally looked upon as ſo well aſcertained. "The change of colour produced in vegetable juices by the electric ſpark (ſays he), is adduced as a proof of the acidity of fixed air; but it has been already ſhown, that this does not ariſe from acid, but phlogiſtic matter*. The acid quality of fixed air is alſo generally inferred from its power of diſſolving iron. But phlogiſton is alſo a ſolvent of iron. Thus a conſiderable portion of that metal is always diſſolved and held in ſolution by the phlogiſticated alkaline lixivium, which conſiſts of inflammable matter calcined with fixed alkali. M. Margraaf has ſhown, that ſeveral other metals are ſoluble in this lixivium. Hence it it evident, that the ſolubility of iron does not prove the acidity of the ſolvent, but may ariſe from the phlogiſton contained in it.

" Fixed air is alſo ſuppoſed to be an acid, by diminiſhing the cauſticity and promoting the cryſtallization of fixed alkalies: but this hypotheſis does not agree with the effects which are produced by the combination of acids with alkalies. By theſe combinations neutral ſalts are produced; but alkalies do not become neutral by combination with fixed air, being only changed by ſuch an union from cauſtic and deliqueſcent to mild and cryſtallizable alkalies: whence it is evident, that the alteration in them produced by fixed air, is not to be attributed to the introduction of an acid.

" We muſt therefore (continues our author) turn our eyes to the conſideration of ſome other principle by which theſe effects may be produced; and this principle appears to be phlogiſton. The phlogiſticated alkaline lixivium is perfectly mild when ſaturated; and by a ſlight evaporation is reduced to a concrete cryſtalline maſs, which does not deliqueſce or imbibe the leaſt moiſture from the air, and no longer retains any alkaline character or property. M. Beaumé, by an elegant and ingenious experiment, has proved the preſence of phlogiſton in mild alkalies; and has ſhown, that their power of cryſtallizing depends upon their union with that principle. He heated in a ſilver veſſel a lixivium of mild alkali, which imparted to the ſilver a covering or coating of inflammable matter, by which its ſurface was tarniſhed and became black. The lixivium was ſeveral times poured out in the ſilver veſſel; and after the ſurface of the veſſel had been freed from the tarniſh, the lixivium was replaced in it, and again heated, by which the tarniſh was renewed. This was repeated till the lixivium no longer communicated any ſtain to the ſilver. The cauſticity of the lixivium increaſed in proportion as it imparted its phlogiſton to the ſilver; and at the end of the proceſs the alkali became perfectly cauſtic and incapable of cryſtallizing.

" Thoſe inſtances, and many others which might be adduced, ſeem to prove, that the change which fixed air produces in cauſtic alkalies is not effected by acid but phlogiſtic matter. It is certain, that the matter communicated to lime by fixed air, is the very ſame which it imparts to alkalies: for it may be transferred, unchanged, from one of theſe ſubſtances to another; and when united to either of them, ſtill retains the ſame qualities. Therefore, if phlogiſton renders alkalies mild, and effects their cryſtallization, the ſame principle alſo precipitates lime, and in like manner reſtores it to its ſtate of mild calcareous earth.

" The experiments and obſervations on which Dr Black has eſtabliſhed his comprehenſive and conſiſtent theory, clearly prove, that lime is precipitated from lime-water by fixed air; but his views were not extended to an inveſtigation of the particular matter or quality whereby fixed air operates that effect.

" Lime, which has been precipitated from lime-water, and reſtored to the ſtate of a mild calcareous earth, is again ſoluble by the addition of a larger proportion of fixed air; which has been conſidered as an additional proof of the acidity of the latter. It has alſo been conſidered as an extraordinary circumſtance, that two ſuch oppoſite effects ſhould be produced by the ſame ſubſtance.

* See *Chromatics*, n° 31.

The ſimplicity obſerved by nature in her operations, however, will not allow us to ſuppoſe that fixed air is poſſeſſed of two different or oppoſite qualities, by one of which it precipitates, and by the other it diſſolves. The precipitation of lime from lime-water, and its reſolution, are effected by an equable uniform action, exerciſed by one and the ſame principle, which is a conſtituent and eſſential part of fixed air. Such a precipitation and reſolution are not extraordinary or complex phenomena, as has been thought, but are analogous to the ordinary and conſtant effects which ariſe from chemical affinities. This may be exemplified by any compound which aſſumes a concrete and ſolid conſiſtence by its union with a given quantity of fluid, and which by the addition of a larger quantity of the ſame fluid is reduced to a liquid ſtate. Thus, when a due proportion of water is added to iron and vitriolic acid, a mutual attraction takes place between theſe three ingredients, by means of which they are united; and, by their combination, a concrete vitriolic or metallic ſalt is formed. But if a greater quantity of water be added to this concrete ſalt, as the mutual attraction after this addition ſubſiſts equably between the vitriolic ſalt and the whole maſs of water, the acid and ferruginous particles are more minutely divided, and diffuſed uniformly throughout every part of the water. Thus the ſolid concrete ſalt is reſolved, and a vitriolic liquor is formed, in which the water predominates.

" Lime ſtrongly attracts and unites with inflammable ſubſtances, as ſulphur, camphor, and reſins. Fixed air has a ſtill greater affinity with it; becauſe, in all the more groſs ſubſtances, the phlogiſton is allayed with ſalt, earth, and other matters: but in fixed air it exiſts in a purer, and conſequently a more active ſtate.

" As alkalies are rendered mild or cauſtic by the preſence or abſence of the inflammable principle, it can hardly be doubted that the difference between mild and calcareous earth and quicklime is alſo occaſioned by a communication or deprivation of the ſame principle.

" The origin of fixed air ſeems to prove its phlogiſtic nature; for all bodies which yield it, yield alſo inflammable matter, but many of them do not yield any acid. Calcareous ſpar, magneſia, and alkaline ſalts, ſend forth fixed air; and all theſe ſubſtances, by the loſs of it, are deprived of their inflammable contents. Diamonds, expoſed to the focus of a burning glaſs under a receiver, impart to the air contained in it a power of precipitating lime from lime-water when it is agitated with it: But it does not appear that any acid can be derived from theſe bodies.

" Some of the properties of fixed air are conſiſtent with either the character of an acid or phlogiſton. Such are, its power of altering the colour of vegetable juices; its affinity to alkalies, and ready union with lime; its power of diſſolving iron, which is inſtanced in all acids, and likewiſe in the phlogiſticated alkaline lixivium. The antiſeptic quality prevails equally in acids, and in inflammable ſpirits. Acids are diſengaged from ſubſtances which are decompoſed by ſtronger acids; phlogiſton is likewiſe expelled from bodies which diſſolve in acids.

" The qualities of acid and phlogiſton agree in theſe and ſeveral other inſtances; but fixed air is endowed with properties which are peculiar to phlogiſton: ſuch as its power of effecting the cryſtallization of alkalies without changing them to neutral ſalts; its tendency to eſcape from water; and its affinity with the air, by means of which a conſiderable quantity of fixed air is united with and diffuſed throughout every part of the atmoſphere.

" Water, as well as phlogiſton, is a conſtituent part of all ſubſtances which yield fixed air. Both theſe principles have a ſtrong affinity to air. This appears from the union which air forms with the inflammable principle when it is diſengaged from bodies by combuſtion, fermentation, putrefaction, or any other mode of decompoſition; and from the mutual attraction of water and air, which is manifeſted by evaporation, and by the conſtant preſence of aqueous particles in the atmoſphere.

" The laws of chemical analyſis will hardly permit us to doubt that the air which is obtained from mild alkalies, calcareous earth, and various other ſubſtances, receives from them, when they are decompoſed, the ſame contents which were united in them as conſtituent parts while they were in their entire ſtate; and their analyſis invariably ſhews, that air, water, and phlogiſton enter their compoſition.

" Hence it ſeems to follow, that fixed air conſiſts of theſe three ingredients, either united in bodies, and diſcharged from them already combined, or that it is formed in the atmoſphere by the concurrence and union of theſe principles: and the phenomena both of fixed and phlogiſticated air may be ſolved by the action and properties of theſe ingredients.

" The weight of fixed air indicates that it contains a conſiderable portion of aqueous matter; and it is by means of this conſtituent principle that it is miſcible with water, in like manner as ardent ſpirits are, notwithſtanding their inflammable nature.

" Phlogiſtic matters are miſcible with water only in proportion as they contain a quantity of the aqueous principle in their compoſition. When the relative proportion of this conſtituent principle is leſs than that of the phlogiſton combined with ſuch matters, they are either immiſcible with water, or miſcible only in part. Thus, ſpirit of wine unites with water in all proportions. Ether, which is ſpirit of wine deprived of part of its water by means of the vitriolic acid, is not miſcible with water in all proportions; but ten parts of water are requiſite to the abſorption of one part of ether. Oil, which has ſtill leſs water in its compoſition, does not in any degree mix with water. Reſinous ſubſtances do not combine with water, becauſe their aqueous part is not in ſufficient quantity to ſerve as a medium for the union of their phlogiſton. In gums the relative proportion of phlogiſton is much leſs than in reſins, and that of the water is much greater; and, by the intervention of their aqueous part, gums are readily miſcible with water. Reſins, when united with a due proportion of gum, are by its mediation alſo rendered ſoluble in water. But if a leſs proportion of the gum be joined with the reſin, only a part of the compound reſulting from this union is diſpoſed to mix with water, and a reſiduum is left which is incapable of being diſſolved in any aqueous liquor.

“ Fixed air ſeems to reſemble thoſe matters which do not poſſeſs a ſufficient quantity of aqueous matter to render them totally ſoluble in water; for after a given portion of fixed air has been imbibed by water, a reſiduum remains which is incapable of being abſorbed by it, and is called *phlogiſticated air*. This air may be formed from fixed air, not only by the ſubtraction of water, but by the addition of the inflammable principle; as when phlogiſton is communicated to fixed air by electric ſparks, or the vapours diſengaged from a mixture of ſulphur and iron-filings.

“ The origin of phlogiſticated air, ſhows that its difference from fixed air conſiſts chiefly in the deficiency of water. Hence, as metals contain no water, the phlogiſton which ariſes from them during calcination produces no fixed but phlogiſticated air. But vitriols, and all other ſaline matters, containing water as a conſtituent part, yield fixed air. Calces of metals alſo, which have received aqueous matter in the proceſs of their calcination, as white-lead and other calces, which have abſorbed water, together with the air, from the atmoſphere, yield alſo fixed air. The fermentation and putrefaction of animal and vegetable ſubſtances is effected by means of their moiſture, and therefore fixed air is produced in theſe proceſſes. It is more effectually produced by reſpiration than by many other phlogiſtic proceſſes, in conſequence of the copious ſupply of the aqueous as well as the phlogiſtic principle, which the air receives from the lungs.

“ Fixed air may be formed from vegetable acids; but when it is thus conſtituted, it does not differ from that which is produced from alkalies, magneſia, and other ſubſtances which yield no acid. It is therefore evident, that in each of theſe inſtances it is formed by the combination of ſome principles which are common to all thoſe ſubſtances. Theſe principles are water and phlogiſton. In vegetable acids, the phlogiſton combined with the water is equal in quantity to that which conſtitutes the inflammable part of ſpirit of wine; for radical or concentrated vinegar is totally inflammable. The acid ſtate of vegetable matters is not eſſential to them, nor is it requiſite to the production of fixed air from them; for fixed air is producible from recent plants. Hence it appears, that in their acid, as well as in their recent, vinous, or putrefactive ſtate, they yield fixed air by means of their aqueous and phlogiſtic principles.

“ All fixed air, from whatever ſubject it may be procured, or to whatever bodies it is transferred, conſiſts conſtantly and invariably of the ſame materials, combined in the ſame proportions; otherwiſe it could not reſtore lime, cauſtic alkalies, &c. to their original mild ſtate; becauſe theſe ſubſtances cannot be recompoſed but by the ſame proportion of their conſtituent principles which they contained before their decompoſition. Thus, lime cannot be reſtored to the ſtate of mild calcareous earth by water or by pure dephlogiſticated air, becauſe each of theſe principles conſiſts only of one of the three ingredients which are requiſite for that purpoſe. Nor can the recompoſition of calcareous earth be effected by phlogiſticated air, becauſe it contains an exceſs of phlogiſton, and a defect of water. Compounds formed of ſuch ingredients as do not contain a requiſite quantity of the principles neceſſary to conſtitute fixed air, may acquire a due proportion of them by an addition of the ingredients in which they are deficient. Pure dephlogiſticated air is reduced to fixed air by the communication of aqueous and phlogiſtic vapours diſengaged from bodies by various proceſſes: theſe principles have a great affinity to air, and readily combine with it. Phlogiſticated air, when agitated with water, receives into its compoſition a quantity of aqueous particles ſufficient to conſtitute it fixed air; and by that means it becomes capable of precipitating lime from lime-water. If the analyſis and recompoſition of calcareous earth be ever ſo often repeated, its analyſis will always yield, and its recompoſition will always require, the ſame relative quantities of air, water and phlogiſton. Fixed air therefore ſeems to conſiſt of theſe three principles invariably and conſtantly combined in the ſame proportions. It has been frequently conſidered as a mere compound of air and phlogiſton; but ſuch a compound ſeems to approach nearer in its nature to phlogiſticated air, as it is deficient in one of the principles which is eſſential to fixed air.”

2 Obſervations on this theory.

On this account of fixed air it may be obſerved, that notwithſtanding all our author's arguments, there is no poſitive proof adduced againſt the acidity of fixed air. It is not certainly known whether mere phlogiſton will perfectly neutralize alkalies. The colouring matter of Pruſſian blue indeed will certainly do ſo: but this is not pure phlogiſton, but a compound of different ſubſtances; and beſides the alkalies neutralized by it differ very conſiderably from thoſe rendered neutral by fixed air. Before we can attribute the effects of fixed air to mere phlogiſton, therefore, it would be neceſſary to form out of a cauſtic alkali, by means of pure phlogiſton, a ſalt exactly reſembling mild alkali produced by the union of the ſame cauſtic ſalt with fixed air; ſo that it ſhall not only have the ſame taſte and other external properties, but likewiſe emit fixed air upon the addition of a mineral acid. But by no experiment have we yet been able to effect this. It is abſolutely neceſſary that the inviſible and unknown ſubſtance called by Lavoiſier the *oxygenous principle*, by others the *baſis of dephlogiſticated* or *vital air*, ſhould be united to the inflammable matter, in order to the formation of the fixed air: and as this baſis is likewiſe found to be neceſſary to the formation of every acid, or at leaſt to thoſe of the mineral kind, we have equal reaſon to call fixed air an acid while it diſplays the properties of one.

That water is an eſſential ingredient in the compoſition of fixed air as well as all other kinds of aerial vapours, is not to be doubted; but we are by no means certain whether the difference between fixed and phlogiſticated air conſiſts in the want of water in the latter. The ſpecific gravity here cannot be any rule for us to judge of the matter: for inflammable air, the lighteſt of all the kinds hitherto known, cannot be produced without a certain proportion of water; and by ſome proceſſes fixed air may be converted into inflammable as well as phlogiſticated air.

3 Account of the effects of this air on a perſon long expoſed to it.

The noxious properties of fixed air are well known, and are too often fatally experienced by the miners, who have given it the appellation of *choke-damp*. In the Mancheſter Tranſactions, however, we have an account of one who continued ſeven days below ground, not only expoſed to the effects of this gas, but without any kind of ſuſtenance; notwithſtanding which, he was taken out alive. When firſt found in the pit, the ſides of which had fallen in and confined him for the time abovementioned, his eyes were ſo ſwollen and protruded out of their ſockets, that he had a ſhocking appearance; for which reaſon, the people tied a handkerchief round his head. While in this protruded ſtate, however, he was capable of diſtinguiſhing objects; but in a little time his eyes ſunk within their ſockets, and he became quite blind. On being taken out of the pit, he ſeemed for ſome time to be in a way of recovery; but all favourable ſymptoms ſoon vaniſhed, and he expired in three days after his releaſe.

During all the time of his confinement he had only a ſpace to breathe in of three yards in length and two in breadth, in which he lay upon his belly. It communicated indeed with another pit by a paſſage 80 yards in length and about eight or ten inches wide; but as the mouth of the pit into which he deſcended was ſtopped, and the body of earth through which he had dug thrown behind him, no circulation of air could poſſibly take place. The truth of this concluſion was likewiſe evinced by the ſtate of the air in the other pit through which the people entered to dig out the unfortunate ſufferer; for it was there ſo foul, that the candles they carried down with them were immediately extinguiſhed. In this ſtate of the air which ſurrounded him, it is remarkable that the patient, who was naturally aſthmatic, breathed freely and continued to do ſo till his death: And on his ſubject Dr Percival makes the following remarks.

4 Conjecture concerning the manner in which it acts.

“As he had been long aſthmatic, we may reaſonably conclude from his ſuffering ſo little, that the commonly received opinion of the *ſuffocating* nature of the mephitis or choke-damp, that it deſtroys the elaſticity of the air, and occaſions a collapſion of the lungs, is without foundation, notwithſtanding all the reſpectable authorities that may be advanced in ſupport of it. Indeed, from the phenomena which attend the extinction of life in thoſe to whom ſuch vapours have proved mortal, it is evident that the poiſon acts chiefly on the nervous ſyſtem. The vital principle ſeems to be arreſted and almoſt inſtantaneouſly deſtroyed; ſometimes even without a ſtruggle, and poſſibly without any antecedent pain. Pliny the elder was found, after the fatal eruption of Mount Veſuvius, exactly in the poſture in which he fell, with the appearance of one aſleep rather than dead. Some perſons killed by foul air in a cellar at Paris, were found ſtiff as ſtatues, with their eyes open, and in the poſture of digging. M. Beaumé relates the hiſtory of a man who was recovered from apparent death produced by a ſimilar cauſe, and who aſſerted that he had neither felt pain nor oppreſſion; but that at the point of time when he was loſing his ſenſes, he experienced a delightful kind of delirium. This account receives ſome confirmation from what Dr Heberden ſays in his lectures on poiſons, that he had ſeen an inſtance in which the fumes of charcoal brought on the ſame kind of delirium that is produced by henbane and other intoxicating poiſons of the vegetable kind. Abbé Fontana breathed a certain portion of inflammable air, not only without inconvenience, but with unuſual pleaſure. He had a facility in dilating the breaſt, and never felt an equally agreeable ſenſation even when he inhaled the pureſt dephlogiſticated air. But he ſuffered greatly in a ſubſequent experiment: for having filled a bladder, containing about 350 cubic inches, with inflammable air he began to breathe it boldly after diſcharging the atmoſphere air contained in his lungs by a violent exſpiration. The firſt inſpiration produced a great oppreſſion; towards the middle of the ſecond, he was obſerved to become very pale, and objects appeared confuſed to his eyes: nevertheleſs he ventured on a third; but his ſtrength now failed, ſo that he fell upon his knees, and ſoon afterwards upon the floor. His reſpiration continued to be effected with pain and difficulty, and he did not perfectly recover till the ſucceeding day. In this inſtance ſome degree of palſy was probably induced in the nerves of the lungs by the action of concentrated inflammable air conveyed into the veſicles forcibly emptied of their atmoſpheric air by exſpiration. For, in ordinary reſpiration, about 35 inches of air are inhaled and exhaled; but in a violent exſpiration, about 60 cubic inches may be diſcharged. In the caſe of the unfortunate collier (Travis), it will be remembered, that the air was ſufficiently ſalubrious when he went down into the pit; that by ſtagnation it became gradually noxious; and that his nervous ſyſtem muſt therefore have been progreſſively habituated to its influence. This is conformable to the obſervations of Dr Prieſtley; who found, that if a mouſe can bear the firſt ſhock of being put into a veſſel filled with artificial gas, or if the gas be increaſed by degrees, it will live a conſiderable time in a ſituation that would inſtantly prove fatal to other mice: and he frequently noticed, that when a number of mice had been confined in a given quantity of infected air, a freſh mouſe introduced among them has immediately died in convulſions.

5 Symptoms produced in various perſons who breathed

6 Noxious fumes from the quantity of fuel conſumed in large cities.

“It has been found by experiment, that the fumes emitted by almoſt every ſpecies of burning fuel prove fatal to animals, when applied in a ſufficiently concentrated ſtate. I have computed, that 300 tons of coal are every day conſumed in the town of Mancheſter during the winter ſeaſon. The factitious gas generated by its conſumption muſt amount to at leaſt a third part of that quantity; it is probable that the ſmoke proceeding from it conſtitutes another third part; and both together are capable of occupying a ſpace of very wide extent. Now, if it were not for the diſperſion of theſe vapours by the wind, the precipitation of them by rain, and the influence of other cauſes, reſpiration could not be carried on in ſuch circumſtances. And we may obſerve, that froſty weather, which is generally ſerene and without wind, proves extremely oppreſſive, and ſometimes even fatal, to aſthmatic patients, eſpecially in great cities. Indeed the rate of human mortality is nearly in proportion to their magnitude and population. It is evident, therefore, that habit, however it may abate, cannot entirely counteract the baneful effects of bad air; and thoſe will feel its effects the more ſtrongly, in every ſituation, whoſe nervous ſyſtems are endowed with more than ordinary ſenſibility. Such perſons I would caution not to indulge their curioſity in the inſpection of unwholeſome manufactures, nor in viſiting mines, caverns, ſtoves, hoſpitals, or priſons. The late Dr Brown ſuffered very ſeverely by accompanying two foreigners of diſtinction into the duke of Bridgewater's works at Worſley. It happened that they were the firſt who entered the tunnel on that day. The candles which they carried with them were obſerved to burn very dimly; but neither the paſſengers nor the boatmen experienced any difficulty in reſpiration. After remaining in the coal-pits a conſiderable time, they proceeded to Warrington, where Dr Brown was attacked by violent pains, which ſhifted ſuddenly from one part of his body to another; ſmall purple ſpots overſpread his ſkin; his throat became tumefied ſo as to render ſwallowing difficult; and great proſtration of ſtrength, with a low fever, enſued. The doctor was ſubject to the anomalous gout; had once a paralytic complaint of long continuance, and hence we may conclude that his nervous ſyſtem was endowed with peculiar irritability. He was not, however, the only ſufferer; for one of the foreigners was affected with ſimilar petechiæ, but attended with little pain or diſorder."

7
In what manner the atmoſphere may be purified from too great a quantity of fixed air.

Here we may obſerve, that our knowledge of the compoſition of fixed air ſeems to throw ſome light upon the ſubject in queſtion. Dephlogiſticated air and phlogiſton are univerſally allowed to be the component parts; and whether we ſuppoſe, with Mr Delaval, water to be a third ingredient or not, the caſe will ſtill be the ſame; for by whatever means the ſeparation of the phlogiſton can be effected, the air will be rendered pure. This is aſcertained by ſome of Dr Prieſtley's experiments, particularly thoſe related under the article Aerology, n° 113. where the phlogiſton was plainly ſeparated by the electric ſpark, and the dephlogiſticated air remained in a ſtate of purity. When the atmoſphere is contaminated by a mixture of fixed air, therefore, it may be purified in two very different ways: one is by the abſorption of the gas without any decompoſition, as by lime-water, alkaline ſalts, &c. the other, by the ſeparation of its component parts, by which a portion of it muſt neceſſarily be exchanged for a portion of pure reſpirable air. It is probable that nature purſues both theſe methods in freeing the atmoſphere from this noxious gas: but indeed, whatever method ſhe takes, it is certain that any large portion of atmoſpheric air cannot long be contaminated with this gas, even though ſeemingly in a confined ſituation. This is evident from ſome experiments, where large quantities of fixed air being poured out into the atmoſphere of a room, entirely vaniſhed, ſo that it could not be perceived by the niceſt teſt, in half an hour. As we are not yet acquainted with the action of the atmoſpheric and fixed air upon each other, when the former is in large proportion, it naturally becomes a matter of ſuſpicion whether the fixed air has not a natural tendency to decompoſition, and conſequently to render the air ſalutary after it has for a ſhort time rendered it noxious. This is certainly the caſe when it meets with vegetables; for many of them are ſupported by every kind of noxious air. In caſes where many animals are confined together, it is probable that their death is not occaſioned by the *fixed air* produced from their reſpiration, but by that which is called *phlogiſticated*, or moſt probably by the total deprivation of the vital principle ſupplied by the dephlogiſticated kind. The perſpiration of animal bodies of itſelf ſupplies a reſource for the abſorption of pure fixed air; for all animal exhalations are of the alkaline kind, and therefore are capable of neutralizing this kind of gas. This is evident from a circumſtance generally unnoticed, but which is obvious to every one who chooſes to give himſelf the trouble of inquiry. In waſhing over the walls of rooms with lime and water, which is the firſt preparatory operation for painting, a violent ſmell of volatile alkali is perceptible; and there can be no doubt that this proceeds from a decompoſition of the neutral ſalt formed by the union of the fixed air, produced in reſpiration, with the ſubtile phlogiſtic and alkaline effluvia which riſe in perſpiration. To this cauſe we may in a great meaſure aſcribe the preſervation of the Ruſſians, which Dr Percival alſo takes notice of, but aſcribes it to an *accommodating* quality of the human frame by which it can ſubſiſt in ſo great a variety of circumſtances. "A Ruſſian boor (ſays he), in the winter ſeaſon, experiences all the varieties of air, heat, and cold, without any inconvenience. When labouring out of doors, he is expoſed to the intenſity of froſt and ſnow; when he retires in the evening to his hut, which conſiſts only of one cloſe apartment, never ventilated during ſix months, he feeds upon ſalted fiſh or fleſh, and afterwards repoſes on a greaſy mattraſs placed over an oven in which billets of wood are burned. In this ſituation he is literally ſtewed, with his whole family, who live in a conſtant ſteam, not offenſive to themſelves, but ſcarcely ſupportable by a ſtranger. The atmoſphere of a crowded town muſt, in many reſpects, reſemble the foul air of a Ruſſian cottage; yet thouſands enjoy in it a conſiderable ſhare of health."

8
Of the quantity of vital air requiſite for the ſupport of human life in different ſituations.

On this we muſt further obſerve, that in certain caſes the human body requires much more the vital principle ſupplied by dephlogiſticated air to ſupport life than in others. This is particularly the caſe when much motion and exerciſe are uſed; ſo that the computations made of the quantity of air conſumed by a human creature in a minute, muſt be very vague and variable. This was evident in M. Sauſſure's journey to the top of mount Blanc, where, beſides the general rarefaction of the atmoſphere, there was a great mixture of fixed air, as appeared by the precipitation of lime-water when expoſed to the action of the common air. Here, though always ſomewhat uneaſy, yet he was comparatively well while he remained in a ſtate of inaction; but felt exceſſive trouble on being obliged to exert his ſtrength, inſomuch that he could ſcarce accompliſh in four hours and an half, the experiments which at the foot of the mountain he would have eaſily done in three. "While I remained perfectly ſtill (ſays he), I experienced but little uneaſineſs, more than a ſlight oppreſſion about the heart; but on the ſmalleſt bodily exertion, or when I fixed my attention upon any object for ſome moments together, particularly when I preſſed my cheſt in the act of ſtooping, I was obliged to reſt and pant for ſome minutes."

From this account we muſt naturally conclude, that in caſes where the powers of life and circulation are ſtrong and vigorous, a great quantity of vital principle is requiſite to ſupport life; and the ſudden deprivation of any conſiderable part of it may occaſion death, even though

9 Why ſudden changes from noxious to pure air are dangerous.

10 The human body may ſometimes abſorb nouriſhment from the atmoſphere.

though as much ſtill remain as would be ſufficient to ſupport life in other circumſtances. Hence, if a ſtrong and healthy animal is ſuddenly plunged into an atmoſphere loaded with mephitic or other noxious vapours, it will very frequently die in a moment; while the mere circumſtances of debility cauſes others to bear the ſame ſituation with impunity. In theſe circumſtances a ſudden expoſure to very pure air might even be fatal to an animal very long confined in ſuch as is noxious, juſt as fire may be put out by too violent a blaſt of air. Hence we may underſtand why conſumptive perſons are not recovered, but often made manifeſtly worſe by being brought into purer air; and in all probability the death of Travis was haſtened by his ſudden removal into the open atmoſphere. His remaining alive, therefore for ſuch a length of time in circumſtances ſo very unfavourable, we are to attribute in a particular manner to the extreme debility of the vital powers, by which an exceedingly ſmall quantity of dephlogiſticated air was required to ſupport them. We are beſides to take into conſideration, that in certain caſes the air will impart nouriſhment, even to the bodies of animals as well as vegetables. Under the article **Abstinence**, inſtances are brought of animal bodies being augmented in bulk without any nouriſhment taken in by the mouth. In ſuch caſes we muſt conclude that the nouriſhment came from the phlogiſtic particles diſperſed through it. It is not impoſſible therefore, that in ſome caſes the human body, by abſorbing from the atmoſphere the phlogiſton which it had juſt emitted by reſpiration, may purify the air which it had juſt before contaminated; and thus life might be prolonged in the caſe of Travis, who was not only deſtitue of air proper for reſpiration, but of food and drink alſo. In caſes of famine, it is manifeſt that there is a great abſorption from the atmoſphere. Thus a negroe who was gibbeted at Charleſtown, and had nothing given him afterwards, voided a large quantity of urine every morning; and in caſes of lientery and diabetes, the quantity of evacuations greatly exceeds the nouriſhment taken in by the mouth. On this principle perhaps we may account for that very ſtrange phenomenon of animals being found alive in the heart of ſolid bodies, where there could be no poſſibility of any connection with the external atmoſphere. Inſtances of theſe are given under the article. **Animalcule**, nº 57.

11 Effects of fixed air on vegetation.

We ſhall conclude this part of our ſubject with ſome obſervations made by Mr Henry on the effects of fixed air on vegetation. Experiments on this ſubject had been made firſt by Dr Prieſtley, and afterwards by Dr Percival, but with very different reſults; the former concluding that fixed air was prejudical to the growth of vegetables, and Dr Percival that it was favourable to it. Mr Henry endeavours to reconcile the difference. He ſuppoſes Dr Percival's meaning to be, not that fixed air, in its pure ſtate and ſtagnant, was favourable to vegetables immerſed in it; but that gradually applied, and in a continued ſtream, while the plants at the ſame time are not confined from the common air, do receive from fixed air ſuch a proportion of nouriſhment as is ſufficient for their temporary ſupport, even when removed from every other means of being ſupplied with food.

Dr Prieſtley, in his third volume on Air, acknowledges the fairneſs and candour with which the experiments of Dr Percival were related, but ſuppoſes there muſt have been ſome miſtake; particularly, as the air was produced by Dr Nooth's apparatus, he thinks the quantity could not be ſo great as was imagined. In ſupport of this opinion he mentioned a great number of experiments, in which fixed air was tried in all proportions, from a ſtate of purity to a mixture of one-third of fixed air with ſeven-eighths of common air; and in all theſe the fixed air was found to be injurious, and to deſtroy the colour of roſe-leaves.

From ſome experiments made by Mr Henry himſelf the contrary opinion ſeemed to be eſtabliſhed. By theſe it appeared that a ſtrawberry plant had not only been preſerved alive, expoſed in the middle of Dr Nooth's machine to copious ſtreams of fixed air, from the 23d of April to the 14th of May, but that the bloſſoms, which were only budded when put into the machine, had actually expanded; a ſtrong proof that the plant had continued to vegetate. It was ſtill alive, but in a ſituation ſomewhat drooping; and happening to be cruſhed on taking it out of the apparatus, it was thrown away altogether. Two ſprigs of mint, with ſome earth looſely adhering to their roots, were ſubjected to a ſimilar experiment from the 1ſt to the 12th of September; the one having a continual current of fixed air applied to it, but the other being left to the operation of common atmoſpherical air. The roots of both were cut off on the 7th: that in common air exhibited ſymptoms of decay on the 12th; but the other continued freſh for more than a week after the other had been decayed almoſt to the top.

On the 11th of April 1777, the weather being very cold and backward, Mr Henry filled the middle part of Dr Nooth's machine entirely with fixed air, by firſt filling it with water, inverting it in the ſame fluid, ſtopping up the capillery tubes, and then driving out the water from the veſſel by a ſtream of fixed air from an effervefcing mixture. The middle was then immediately placed in the lower part of the machine, containing an effervefcing mixture alſo, which had been working for ſeveral minutes; and a crimſon polyanthus was introduced into the middle part, and ſuſpended by a ſtring. In paſſing through the mouth of the veſſel, the petals were compreſſed, and one or two received ſome damage. A young ſprig of mint, with its root, was introduced the ſame day, and into the ſame veſſel; while a ſimilar ſprig, as a ſtandard, was placed in a large glaſs decanter. The polyanthus began to droop on the 15th, and was taken out next day ſhrivelled but not diſcoloured. The mint, when examined on the 12th, was apparently more freſh than when firſt put into the veſſel with fixed air; the next day two young ſhoots appeared ſtill more vigorous. On the 15th its appearance was more vivid than that in common air; but next day it was taken out quite dead. This ſudden change, however, our author ſuppoſes to have been owing to the machine having no valve; and having been violently ſhaken, he ſuſpected that ſome of the vitriolic acid had been forced up through the tubes; for the moiſture on the inſide of the middle part was found to be more acid than it ſhould have been by fixed air alone.

The experiment was repeated on the 26th of April with a polyanthus plant with its root and flowers, which, with ſeveral others, were put into the middle part of Nooth's machine. Here it continued till the 10th of May. The efferveſcence was frequently renewed; for the firſt four days twice, and then once a-day; but the diſcharge of air was continually going on. It continued ten days without any ſigns of decay: and when taken out of the machine on the 14th day though ſome of the older flowers were fading, the others were as freſh and blooming as when put into the veſſel; more ſo than thoſe which had been purchaſed on the ſame day, and planted in the garden. The body of the plant was green, ſucculent, and undecayed. The air extinguiſhed flame. On trial it was found to be one-third fixed air; and during ſeveral days, the proportion of fixed air muſt have been larger.

But, when *confined* in veſſels of fixed air, or even in Nooth's machine, with the upper part and grooved ſtopper put on, plants died ſooner than in common air. The air meaſured was ſeven-eights fixed air.

12
Phlogiſton the food of plants.

"I am informed (ſays Mr Henry), that an ingenious philoſopher of Geneva has made ſome experiments, by which he has proved, not only that phlogiſton is the food of plants, but alſo, to the ſatisfaction of Dr Prieſtley, that it is in the form of fixed air, in proper proportion and place, that this pabulum is adminiſtered. In regard to the animal body, it would ſurely be wrong to ſay that nothing was nutritious or ſalutary to it which it could not bear to receive unmixed or undiluted. Why then may we not ſuppoſe, that though fixed air, when pure, may be fatal to plants confined in it, and excluded from communication with the external air; yet, when applied in a proper doſe, and to plants enjoying a free intercourſe with the atmoſphere, it may have a contrary effect, and ſerve to nouriſh and ſupport them? But in Dr Prieſtley's experiments, this free intercourſe does not appear to have been allowed; and herein, I apprehend, conſiſted the cauſe of the difference in our reſults.

"At that time the conſtitution of fixed air was not underſtood. It is now generally allowed to be formed by a combination of phlogiſton with the pure part of atmoſpheric air. The firſt of theſe ingredients has been proved by Dr Prieſtley and others to be favourable to vegetation; while plants droop and decay when expoſed to the action of the latter. It ſhould further appear from Dr Ingenhouſz's experiments, that plants have the power of ſeparating phlogiſton from common air, applying it to their nurture (A), and throwing out the pure or dephlogiſticated reſiduum as excrementitious. Now allowing, what is highly probable, that they have a ſimilar power of decompoſing fixed air, and of applying and rejecting its conſtituent parts, our method of conducting the experiments was not injurious to the proceſs; whereas, when confined in cloſe veſſels, as by Dr Prieſtley, the plants would be ſuffocated in a manner reverſed to what would happen to an animal. For as in that caſe, from a want of communication with the atmoſphere, as neceſſary to carry off the phlogiſtic air fom the lungs (according to the beautiful theory of reſpiration advanced and ſo well ſupported by Dr Prieſtley), the animal muſt periſh; ſo, in the other inſtance, the plant would die if cut off from the air of the atmoſphere in ſuch a manner that the pure air excreted by its veſſels would not be conveyed from it. For in theſe circumſtances, this fluid, ſo ſalutary to animal but deſtructive to vegetable life, muſt be accumulated in the body of the plant: and its functions being thus impeded, death is the neceſſary conſequence."

13
Methods of impregnating water or other liquors in large quantities with fixed air.

As fixed air is now an article of the materia medica, a method of obtaining it readily and in large quantity becomes an object of conſiderable conſequence. Mr Henry, who has proved that fixed air is the proper baſe of ferments, and the immediate cauſe of fermentation †, deſcribes an apparatus for impregnating wort or other fermentable liquors with it. This apparatus is repreſented Plate CXCIII.

† See *Fermentation*.

A A. Fig. 1. repreſents the caſk in which the wort is to be impregnated; *dd*, the ſtrings by which the air veſſel is to be let down.

Fig. 2. *DD*, The air veſſel, ſimilar to the bottom part of Nooth's glaſs machine, to be made of glaſs or earthen ware. *c c*, A glaſs-ſtopper ground in to fit the mouth of the veſſel, having a number of capillary tubes running from bottom to top in a diverging direction, ſo as to ſpread the air in its paſſage through the liquor.

Fig. 3. The ſtopper viewed ſeparately to ſhow the capillary tubes.

The method of uſing this apparatus is obvious from an inſpection of the figure; but at the ſame time it muſt be equally evident, that it cannot be applied where any very large quantity is to be impregnated. Where great quantities of fixed air are required, we muſt alſo uſe great quanties of fermenting materials; and it would be inconvenient in the higheſt degree to immerge theſe in the liquor to be fermented; not to mention, that where large quantities of this kind of materials are mixed, they ought frequently to be ſtirred or ſhaken, leſt they ſhould concrete into hard lumps; while at the ſame time they are often apt to ſwell, and would thus endanger the ſpoling of the liquor altogether. It muſt alſo be remarked, that any liquid receives an impregnation of fixed air more readily from the ſurface than by blowing it through the maſs of liquid. The apparatus repreſented fig. 4. therefore ſeems preferable to that of Mr Henry, as capable of being extended infinitely almoſt without any additional trouble. *ABCD* repreſents a large wooden caſk filled with materials to the height preſented by *k k*. *E* is a large flat cooler for holding the liquor to be impregnated. This veſſel is to be cloſely covered, and may be conveniently made of lead, having a wooden top, the edges of which are cloſely luted all round with a mixture of ſalad oil and finely powdered chalk. *f*, Repreſents a tin pipe, about an inch in diameter, by which a communication is made between the caſk and cooler for the tranſmiſſion of the fixed air. *g h*, Is a wooden axis paſſing quite through the caſk from top to bottom, and moveable on a centre *h*, having a ſtrong handle at top, to turn it in order to ſtir the mixture. *i i i*, Are four croſs blades fixed into the axis, which, in conſequence of turning the handle, ſtir and raiſe a great commotion in the liquor contained in the caſk. *m*, Is a lage hole ſtopped with a wooden plug, by which the materials may be put in or taked out; and for this laſt purpoſe a kind of ladle with an upright ſtem

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(A) See this further diſcuſſed under the article Aerology, nº 51, 52.

Fire-Ship. Plate CXCIII. Fire Place.

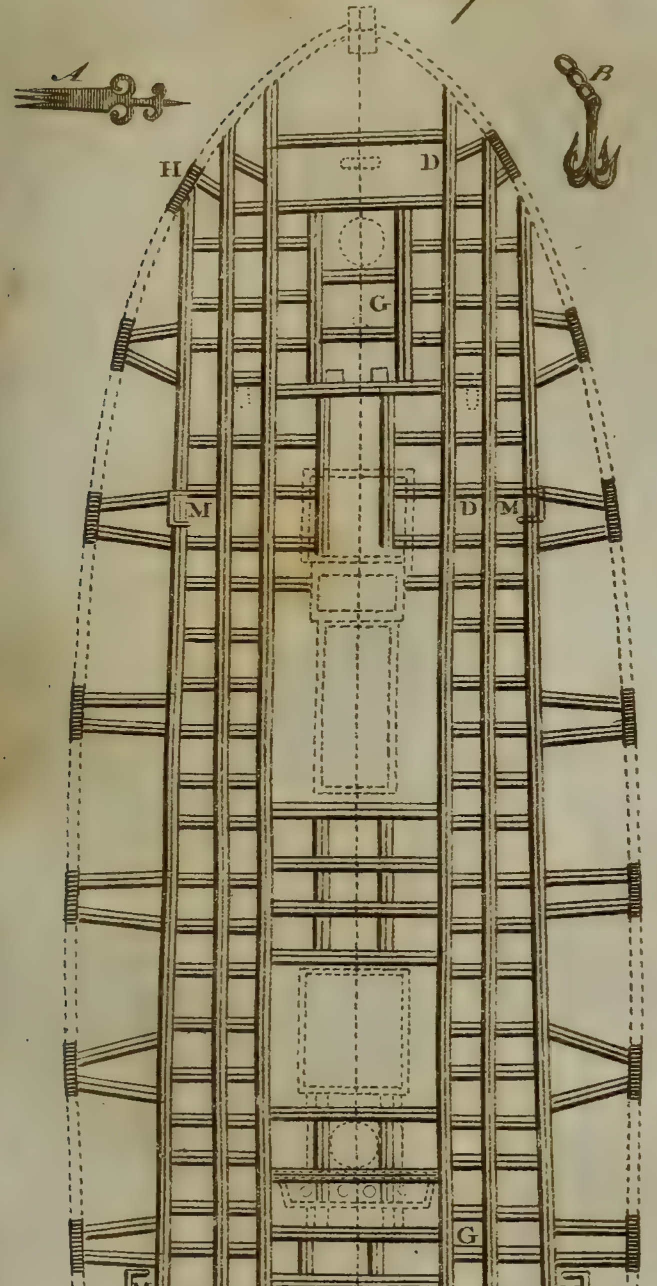


Fig. 1.

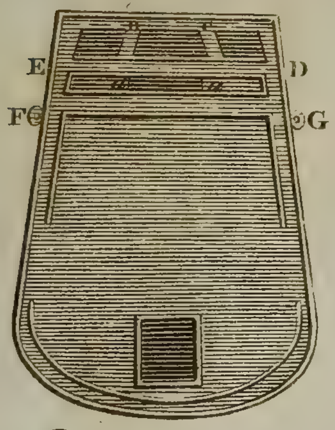


Fig. 2.

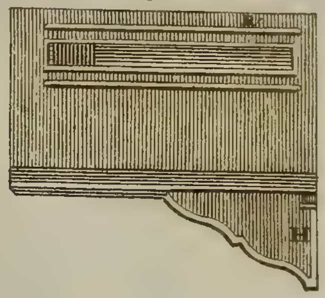


Fig. 3.

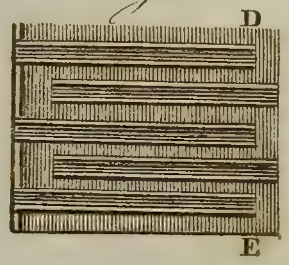


Fig. 4.

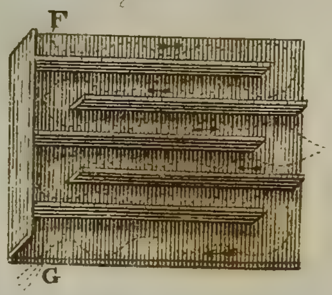


Fig. 5.

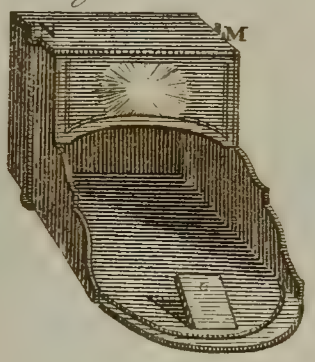
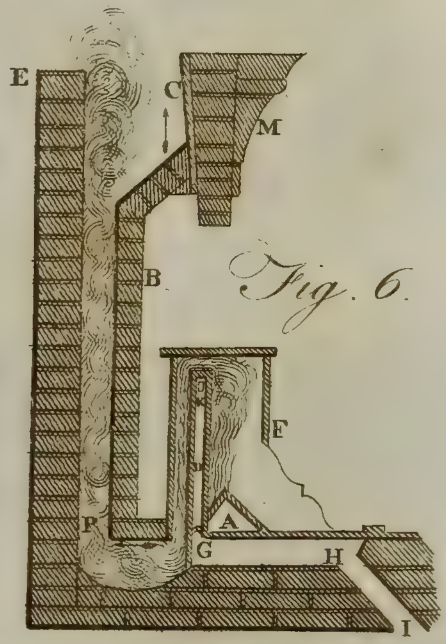


Fig. 6.



Fixed-Air.

Fig. 1.

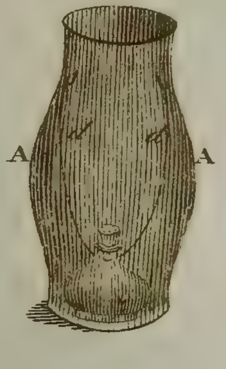


Fig. 3.

Fig. 2.

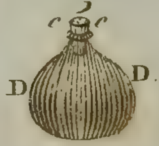
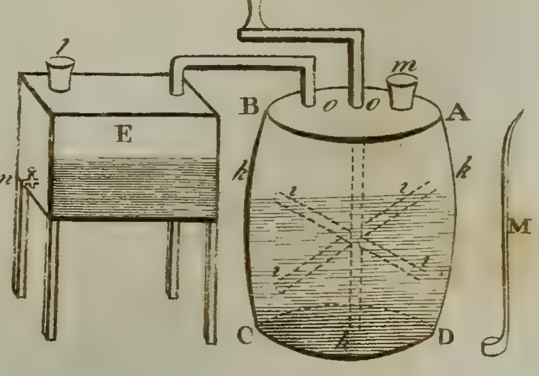


Fig. 4.



ſtem as *M* may be made uſe of. *l*, Is a plug ſtopping up a hole in the lid of the cooler *E*, by which the liquor to be impregnated may be put in, and let out again by the cock *n*.

In this apparatus it is evident, that when an efferveſcing mixture is put into a caſk, the fixed air muſt paſs through the tube *f* into the cooler, where it will be abſorbed by the liquor as faſt as it is emitted by the materials; but in order to prevent it from eſcaping, all the junctures muſt be luted carefully with the mixture of ſalad oil and chalk already mentioned, which is both ſufficiently adheſive, and remaining ſoft for a long time, may be inſtantaneouſly repaired where it happens to be broken. When the efferveſcence begins to turn languid, it may inſtantly be quickened by turning the handle; but this will diſturb the luting at *o o*, which muſt therefore be clapped cloſe all round the axis as ſoon as the matter is ſufficiently ſtirred.

Fixed Stars, are ſuch as conſtantly retain the ſame poſition and diſtance with reſpect to each other *; by which they are contradiſtinguiſhed form *erratic* or *wandering* ſtars, which are continually ſhifting their ſituation and diſtance.—The fixed ſtars are what we properly and abſolutely call *ſtars:* the reſt have their peculiar denominations of *planet* and *comet*. See Astronomy, per *Index*,

FIXITY, or Fixedness, in chemiſtry, is in a peculiar manner uſed for the affection oppoſite to volatility; *i. e.* the property whereby bodies bear the action of the fire, without being diſſipated in fumes.

FLACCUS (Caius Valerius), an ancient Latin poet, of whom we have very imperfect accounts remaining. He wrote a poem on the Argonautic expedition; of which, however, he did not live to finiſh the eighth book, dying at about 30 years of age. John Baptiſta Pius, an Italian poet, completed the eighth book of the Argonautics; and added two more from the fourth of Apollonius; which ſupplement was firſt added to Aldus's edition in 1523.

FLAGS, in the army, are ſmall banners of diſtinction ſtuck in the baggage-waggons, to diſtinguiſh the baggage of one brigade from another, and of one battalion from another; that they may be marſhalled by the waggon-maſter-general according to the rank of their brigades, to avoid the confuſion that might otherwiſe ariſe.

Flag, in the marine, a certain banner or ſtandard, by which an admiral is diſtinguiſhed at ſea from the inferior ſhips of his ſquadron; alſo the colours by which one nation is diſtinguiſhed from another. See Plate CXCIV.

In the Britiſh navy, flags are either red, white, or blue; and are diſplayed from the top of the main-maſt, fore-maſt, or mizen-maſt, according to the rank of the admiral. When a flag is diſplayed from the flag-ſtaff on the main-maſt, the officer diſtinguiſhed thereby is known to be an admiral; when from the fore-maſt, a vice-admiral; and when from the mizen-maſt, a rear-admiral.

The firſt flag in Great-Britain is the royal ſtandard, which is only to be hoiſted when the king or queen are on board the veſſel: the ſecond is that of the anchor of hope, which characteriſes the lord high admiral, or lords commiſſioners of the admiralty: and the third is the union-flag, in which the croſſes of St George and St Andrew are blended. This laſt is appropriated to the admiral of the fleet, who is the firſt military officer under the lord high admiral.

The next flag after the union is that of the white ſquadron, at the main-maſt head; and the laſt, which characteriſes an admiral, is the blue, at the ſame maſt-head.

For a vice-admiral, the firſt flag is the red, the ſecond the white, the third the blue, at the flag-ſtaff on the fore-maſt.

The ſame order proceeds with regard to the rear-admirals, whoſe flags are hoiſted on the top of the mizen-maſt: the loweſt flag in the Engliſh navy is accordingly the blue on the mizen-maſt.

To Lower or Strike the Flag, in the marine, is to pull it down upon the cap, or to take it in, out of the reſpect, or ſubmiſſion, due from all ſhips or fleets inferior to thoſe any way juſtly their ſuperiors. To lower or ſtrike the flag in an engagement, is a ſign of yielding.

The way of leading a ſhip in triumph is to tie the flags to the ſhrouds, or the gallery, in the hind-part of the ſhip, and let them hang down towards the water, and to tow the veſſels by the ſtern. Livy relates, that this was the way the Romans uſed thoſe of Carthage.

To Heave out the Flag, is to put out or put abroad the flag.

To hang out the White Flag, is to aſk quarter; or it ſhows, when a veſſel is arrived on a coaſt, that it has no hoſtile intention, but comes to trade, or the like. The red flag is a ſign of defiance, and battle.

Flag is alſo uſed for ſedge, a kind of ruſh.

*Corn-*Flag. See Gladiolus.

Sweet-ſcented Flag. See Acorus.

Flag-Officers, thoſe who command the ſeveral ſquadrons of a fleet; ſuch are the admirals, vice-admirals, and rear-admirals.

The Britiſh flag-officers are, the admiral, vice-admiral, and rear-admiral, of the white, red, and blue. See Admiral, Flag, and Fleet.

Flag-Ship, a ſhip commanded by a general or flag-officer, who has a right to carry a flag, in contradiſtinction to the ſecondary veſſels under the command thereof.

Flag-Stone, a genus of argillaceous earths, of a grey, yellowiſh, or reddiſh-white colour; not giving fire with ſteel, nor efferveſcing with acids. Its ſpecific gravity is from 2600 to 2780. Sometimes it is found compact, and ſometimes like the argillaceous grit; in which caſe its gravity is leſs. Its general uſe is for flooring houſes, though ſometimes it is made uſe of for covering them. There is alſo a calcareous flag-ſtone, found near Woodſtock in England. It is of a yellowiſh-white colour, and moderately hard, containing a little iron. Its ſpecific gravity is 2585.

FLAGELLANTES, a ſect of wild fanatics who chaſtiſed and diſciplined themſelves with whips in public.

The ſect of the Flagellantes had its riſe in Italy in the year 1260; its author was one Rainier a hermit; and it was propagated from hence through almoſt all the countries of Europe. It was in all probability no more than the effect of an indiſcreet zeal. A great number of perſons of all ages and ſexes made proceſſions,

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* See *Aſtronomy*, nº 192.

ſions, walking two by two with their ſhoulders bare, which they whipped till the blood ran down, in order to obtain mercy from God, and appeaſe his indignation again the wickedneſs of the age. They were then called the *devout;* and having eſtabliſhed a ſuperior, he was called the *general of the devotion.* Though the primitive Flagellantes were exemplary in point of morals, yet they were joined by a turbulent rabble, who were infected with the moſt ridiculous and impious opinions; ſo that the emperors and pontiffs thought proper to put an end to this religious phrenſy, by declaring all devout whipping contrary to the divine law, and prejudicial to the ſoul's eternal intereſt.

However, this ſect revived in Germany towards the middle of the next century, and rambling through many provinces, occaſioned great diſturbances. They held, among other things, that flagellation was of equal virtue with baptiſm and the other ſacraments; that the forgiveneſs of all ſins was to be obtained by it from God without the merits of Jeſus Chriſt; that the old law of Chriſt was ſoon to be aboliſhed, and that a new law enjoining the baptiſm of blood to be adminiſtered by whipping, was to be ſubſtituted in its place; upon which Clement VII. by an injudicious as well as unrighteous policy, thundered out anathemas againſt the Flagellantes, who were burnt by the inquiſitors in ſeveral places; but they were not eaſily extirpated. They appeared again in Thuringia and Lower Saxony in the 15th century; and rejected not only the ſacraments, but every branch of external worſhip; and placed their only hopes of ſalvation in faith and flagellation, to which they added other ſtrange doctrines concerning evil ſpirits. Their leader Conrad Schmidt and many others were committed to the flames by German inquiſitors in and after the year 1414.

FLAGEOLETS, or FLAJEOLET, a little flute, uſed chiefly by ſhepherds and country-people. It is made of box or other hard wood, and ſometimes of ivory; and has ſix holes beſides that at the bottom, the mouth-piece, and that behind the neck.

FLAIL, an inſtrument for threſhing corn. It conſiſts of the following parts. 1. The hand-ſtaff, or piece held in the threſher's hand. 2. The ſwiple, or that part which ſtrikes out the corn. 3. The caplins, or ſtrong double leathers, made faſt to the tops of the hand-ſtaff and ſwiple. 4. The middle-band, being the leather thong or fiſh-ſkin that ties the caplins together.

FLAIR, in ſea-language. The ſeamen ſay that the work doth flair over, when a ſhip being houſed in near the water, ſo that the work hangs over a little too much, and thus is let out broader aloft than the due proportion will allow.

FLAKE, in the cod-fiſhery, a ſort of ſcaffold or platform, made of hurdles, and ſupported by ſtanchions, and uſed for drying cod-fiſh in Newfoundland. Theſe flakes are uſually placed near the ſhores of fiſhing-harbours.

FLAKE, in gardening, a name given by the floriſts to a ſort of carnations which are of two colours only, and have very large ſtripes, all of them going quite through the leaves.

White-FLAKE, in painting, is lead corroded by means of the preſſing of grapes, or a ceruſs prepared by the acid of grapes. It is brought here from Italy; and far ſurpaſſes, both with regard to the purity of its whiteneſs and the certainty of its ſtanding, all the ceruſs or white lead made with us in common. It is uſed in oil and varniſh painting for all purpoſes where a very clean white is required. The white flake ſhould be procured in lumps as it is brought over, and levigated by thoſe who uſe it; becauſe that which the colourmen ſell in a prepared ſtate is levigated and mixed up with ſtarch, and often with white lead, and worſe ſophiſtications.

FLAMBEAU, or FLAMBOY, a luminary made of ſeveral thick wicks, covered over with wax, ſerving to burn at nights in the ſtreets; as alſo at funeral proceſſions, illuminations, &c.

Flambeaux differ from links, torches, and tapers.—They are made ſquare, ſometimes of white wax, and ſometimes of yellow. They uſually conſiſt of four wicks or branches near an inch thick, and about three feet long, made of a ſort of coarſe hempen yarn half twiſted. They are made with the ladle much as torches or tapers are; *viz.* by firſt pouring the melted wax on the top of the ſeveral ſuſpended wicks, and letting it run down to the bottom. This they repeat twice. After each wick has thus got its proper cover of wax, they lay them to dry; then roll them on a table, and ſo join four of them together by means of a red-hot iron. When joined, they pour on more wax till the flambeau is brought to the ſize required, which is uſually from a pound and half to three pounds. The laſt thing is to finiſh their form or outſide, which they do with a kind of poliſhing inſtrument of wood by running it along all the angles formed by the union of the branches.

The flambeaux of the ancients were different from ours. They were made of woods dried in furnaces or otherwiſe. They uſed divers kinds of wood for this purpoſe; the wood moſt uſual was pine. Pliny ſays, that in his time they frequently alſo burnt oak, elm, and hazle. In the ſeventh book of the Æneid, mention is made of a flambeau of pine; and Servius on that paſſage remarks, that they alſo made them of the cornel-tree.

FLAMBOROUGH-HEAD, in geography, a cape or promontory on the eaſtern coaſt of Yorkſhire, five miles eaſt of Burlington, and 216 from London. E. Long. 2°. N. Lat. 54. 15.—This was the *Fleamburg* of the Saxons; ſo called, as ſome think, from the lights made on it to direct the landing of Ida, who in 547 joined his countrymen in theſe parts with a large reinforcement from Germany, and founded the kingdom of Northumberland. In the time of Edward the Confeſſor, Flamborough was one of the manors of Harold, earl of the Weſt-Saxons, afterwards king of England. On his death, the Conqueror gave it to Hugh Lupus; who, in perpetual alms, beſtowed it on the monaſtry of Whitby.—The town is on the north ſide; and conſiſts of about 150 ſmall houſes, entirely inhabited by fiſhermen; few of whom, as is ſaid, die in their beds, but meet their fate in the element they are ſo converſant in. The cliffs of the Head are of a tremendous height and amazing grandeur. Beneath are ſeveral vaſt caverns; ſome cloſed at the end; others pervious, formed with a natural arch. In ſome places the rocks are inſulated, and of a pyramidal figure, ſoaring up to a vaſt height. The baſes of moſt are ſolid, but in ſome pierced through and arched. The colour of all theſe rocks is white, from the dung of the innumerable flocks of migratory birds, which quite cover the face of them, filling every little projection, every hole that will give them leave to reſt.

FLAME, is a general name for every kind of luminous vapour, provided the light it emits hath any conſiderable degree of intenſity. The name *flame*, however is moſt generally applied to ſuch as are of a connical figure, like thoſe ariſing from our common fires; without this they are commonly called *luminous vapours*, or ſimply *lights*.

According to Sir Iſaac Newton, flame is only *red-hot ſmoke*, or the vapours of any ſubſtance raiſed from it by fire, and heated to ſuch a degree as to emit light copiouſly. This definition ſeems to be the moſt accurate and expreſſive of any. It is certain that bodies are capable of emitting flame only in proportion to the quantity of vapour that riſes from them. Thus wood, coals, &c. which emit a great quantity of vapour, flame violently; while lead, tin, &c. which emit but a ſmall fume, can ſcarce be perceived to flame at all.

This rule, is however by no means to be depended upon in all caſes. Some vapours *ſeem* to be in their own nature uninflammable, and capable of extinguiſhing flame: as thoſe of water, the mineral acids, ſal-ammoniac, arſenic, &c.: while others take fire on the ſlighteſt approach of a flaming ſubſtance; ſuch as ether, ſpirit of wine, &c. Theſe laſt mentioned ſubſtances, alſo exhibit a remarkable phenomenon; namely, that they cannot be made to flame without the approach of ſome ſubſtance actually in flames beforehand. Thus, ſpirit of wine poured on a red-hot iron, though inſtantly diſſipated in vapour, will not flame; but if a burning candle touches its ſurface, the whole is ſet in a flame at once. The caſe is otherwiſe with oils, eſpecially thoſe of the groſſer kind; for their vapours will readily be changed into flame by the mere increaſe of heat, without the approach of any flaming ſubſtance.

There is, however, no kind of vapour, perhaps, that is incapable of being converted into flame, provided it is expoſed to a ſufficient degree of heat. Thus the vapour of water made to paſs through burning coals produces an exceedingly ſtrong and bright flame.—It is remarkable that this kind of vapour ſeems to be more powerful than almoſt any other in abſorbing heat, and detaining it in a latent ſtate. Dr Black hath ſhown that when any quantity of aqueous vapour is condenſed, more heat will be ſeparated from it than would have been ſufficient to heat an equal bulk of iron red hot.—It is moſt probably to this property which all vapours have of abſorbing heat, and detaining it in a latent ſtate, that we are to attribute the phenomena of flame, and alſo the exceeding great elaſticity of ſteam. It is certain, that vapours, of water at leaſt, have a much greater power of abſorbing and retaining heat, than the water from which they are raiſed. In open veſſels, water cannot be heated more than 212 degrees of Fahrenheit's thermometer; but in Papin's digeſter, where the vapour is forcibly confined, it has been heated to 400 of the ſame degrees; and, no doubt, might have been heated a great deal more, had the veſſels been ſtrong enough to bear the expanſile force of the ſteam. On opening the veſſels, however, the acceſs of heat was found to have reſided entirely in the vapour; for the water in the veſſel very ſoon ſunk down to 212°, while the ſteam iſſued forth with great violence.

From theſe experiments it appears that the ſteam of water, after it has abſorbed as much heat in a latent ſtate as it can contain, continues to abſorb, or detain among its particles, an unlimited quantity of ſenſible heat; and if the ſteam could be confined till this quantity became great enough to be viſible by its emiſſion of light, there cannot be the leaſt doubt that the vapour would then be converted into flame.

In what manner the heat is detained among the particles of ſteam, is perhaps impoſſible to be explained; but to this heat we muſt undoubtedly aſcribe the violent expanſive force of ſteam of every kind. It ſeems probable that when ſmoke is converted into flame, the latent heat with which the vapour had combined, or rather that which made an eſſential part of it, breaks forth, and adds to the quantity of ſenſible heat which is already preſent. This ſeems probable, from the ſudden exploſion with which all flames break out. If a veſſel full of oil is ſet over the fire, a ſmoke or vapour begins to ariſe from it; which grows gradually thicker and thicker; and at laſt begins to ſhine in ſome places very near the ſurface of the oil, like an electric light, or ſulphur juſt kindled. At this time the oil is very hot, as well as the ſteam which iſſues from it. But this laſt is continually giving off its ſenſible heat into the atmoſphere; ſo that at the diſtance of an inch or two from the ſurface of the oil, the heat of the ſteam will not exceed 400 degrees of Fahrenheit, or perhaps may not be ſo much; but if a burning candle is held in the ſteam for a moment, the whole is immediately converted into flame, with ſomething like an exploſion; after which, the oil burns quietly until it is all conſumed. The flame, as ſoon as it appears, is not only much hotter than the ſteam from whence it was produced, but even than the oil which lies below it. Whence, then, has this ſudden and great increaſe of heat ariſen? It could not be the *ſenſible* heat of the vapour, for that was greatly inferior; nor could it be communicated from the oil, for that could communicate no more than it had to itſelf. The candle, indeed, would communicate a quantity of heat to the vapour which touched its flame; but it is impoſſible that this quantity ſhould extend permanently over a ſurface perhaps 100 times larger than the flame of the candle, in ſuch a manner as to make every part of that ſurface equally hot with the flame of the candle itſelf; for this would be to ſuppoſe it to communicate 100 times more heat than really was in it. The heat therefore muſt have originally reſided in the vapour itſelf: and as, in the freezing of water, its latent heat is extricated and becomes ſenſible, and the water thereupon loſes its fluidity; ſo, in the accenſion of vapour, the latent heat breaks forth with a bright flaſh, and the vapour is then totally decompoſed, and converted into ſoot, aſhes, or water, according to the different nature of the ſubſtances which produce it, or according to the intenſity of the heat.—Several other hypotheſes have been invented to ſolve the phenomena of burning and flaming bodies; for an account of which, ſee the articles IGNITION, PHLOGISTON, &c.

Flames are of different colours, according to the ſubſtances from which they are produced. Thus, the flame of ſulphur and ſpirit of wine is blue ; the flame of nitre and zinc, of a bright white ; that of copper, of a greeniſh blue, &c. Theſe varieties afford an opportunity of making a number of agreeable repreſentations in fire-works, which could not be done if the flame produced from every different ſubſtance was of the ſame colour. See PYROTECHNICS.

FLAMEN, in Roman antiquity, the name of an order of prieſts, inſtituted by Romulus, or Numa ; authors not being agreed on this head.

They were originally only three. viz. the *Flamen Dialis, Flamen Martialis, and Flamen Quirinalis.* The Flamen Dialis was ſacred to Jupiter, and a perſon of the higheſt coonſequence and authority in the ſtate. He diſcharged ſeveral religious duties which properly belonged to the kings, and was honoured with many eminent privileges beyond all other officers, but was obliged to obſerve ſeveral ſuperſtitious reſtraints. The Flamen Martialis was ſacred to Mars, and was ordained to inſpect the rites of that god. The Flamen Quirinalis was ſacred to, and ſuperintended the rites of Quirinus Romulus. The flamines laſt mentioned, though of high authority, were much inferior to the Flamen Dialis. All three were choſen by the people, and conſecrated by the Pontifex Maximus.—In latter times ſeveral prieſts of the ſame order and name were added to them, but inferior in power. The whole number at laſt amounted to 15: the three firſt of whom were ſenators, and called *Flamines majores* ; the other 12, taken from among the people, being denominated *Flamines minores.*—Some authors tell us the Romans had a Flamen for every deity they worſhipped. The greater Flamines wore the robe and edged with purple, like the great magiſtrates : had an ivory chair, and a ſeat in the ſenate. They wore a little band of thread about their heads, whence their name is ſaid be derived, *Quaſi Filamines.* Wife of the Flamen Dialis was called *Flaminica,* and wore a flame coloured habit, on which was painted a thunder-bolt, and above her head-dreſs ſhe had green oak boughs, to indicate that ſhe belonged to Jupiter the thunderer, to whom the oak was ſacred. The Flamines wore each of them a hat or cap called *Flammeum* or *Apex.*

FLAMINGO, in ornithology. See PHOENICOPTERUS.

FLAMINUS, or FLAMINIUS, (T. Q.) a celebrated Roman raiſed to the conſulſhip in the year of Rome 554, though under the age of 30. He was trained in the art of war againſt Hannibal; and he ſhowed himſelf capable in every reſpect to diſcharge with honour the great office with which he was entruſted. He was ſent at the head of the Roman troops againſt Philip king of Macedonia, and in his expedition he met with uncommon ſucceſs. The Greeks gradually declared themſelves his firmeſt ſupporters ; and he totally defeated Philip on the confines of Epirus, and made all Locris, Phocis, and Theſſaly tributary to the Roman power. He granted peace to the conquered monarch, and proclaimed all Greece free and independent at the Iſthmian games. This celebrated action procured the name of Patrons of Greece to the Romans, and inſenſibly paved their way to univerſal dominion. Flaminius behaved among them with the greateſt policy ; by his ready compliance to their national cuſtoms and prejudices, he gained uncommon popularity, and received the name of father and deliverer of Greece. He was afterwards ſent ambaſſador to king Pruſias, who had given refuge to Hannibal; and there his prudence and artifice haſtened out of the world a man who had long been the terror of the Romans. Flaminius was found dead in his bed, after a life ſpent in the greateſt glory, in which he had imitated with ſucceſs the virtues of his model Scipio.

FLAMINIUS, or FLAMINIO, (Mark Anthony), one of the beſt Latin poets in the 16th century, of Imola in Italy, ſon and grandſon of very learned men. The pope had choſen him ſecretary to the council in 1545 ; but he refuſed that employment, becauſe, favouring the new opinions ; he would not employ his pen in an aſſembly where he knew theſe opinions were to be condemned.—He paraphraſed 30 of the pſalms in Latin verſe, and alſo wrote notes on the pſalms ; and ſome letters and poems which are eſteemed. He died at Rome in 1550.

FLAMSTED, a town of Herdfordſhire in England, 5 miles from St Alban's and Dunſtable, ſtands on the river Verlam, and was of old called Verlamſtede. The land hereabouts is a clay ſo thickly mixed with flints, that, after a ſhower nothing appears but a heap of ſtones ; and yet it bears very good corn even in dry ſummers. This fertility is imputed to a warmth in the flint, which preſerves it from cold in the winter ; and to its cloſeneſs, which keeps it from the ſcorching rays of the ſun in the ſummer. Edward VI. when an infant was brought hither for his health , and, it is ſaid the beadſtead he lay on, which is curiouſly wrought, is ſtill preſerved in the manor-houſe juſt by.

FLAMSTEED (John), an eminent Engliſh aſtronomer in the 17th century, born at Derby in 1646. He had early read a great deal of civil and eccleſiaſtical hiſtory ; but happening to ſee John de Sacroboſco's book *de Sphæra,* this gave him a turn for aſtronomy, which ſtudy he afterwards proſecuted with great vigour. His father, finding him in correſpondence with ſeveral leared men, adviſed him to go to London, that he might be perſonally acquainted with them. In 1674, he wrote an ephemeris, in which he ſhowed the falſity of aſtrology ; and gave a table of the moon's riſing and ſetting, carefully calculated, together with the eclipſes and appulſes of the moon and planets to fixed ſtars. This fell into the hands of Sir Jonas More: for whom, at his requeſt, he made a table of the moon's true ſouthings. In 1674, Sir Jonas having informed him, that a true account of the tides would be highly acceptable to his majeſty, he compoſed a ſmall ephemeris for the king's uſe : and when ſir Jonas ſhowed the king and duke of York our author's teleſcopes and micrometer, and recommended him ſtrongly, he procured him a warrant to be king's aſtronomer, with the ſalary of L.100 *per annum* ; on which occaſion he was ordained. In 1675, the foundation of the royal obſervatory at Greenwich was laid, and during the building he lodged at Greenwich ; his quadrant and teleſcopes being kept in the queen's houſe there. His *Doctrine of the Sphere* was publiſhed in 1681, in a poſthumous work of Sir Jonas More, intitled, *A new Syſtem of the Mathematics.* In 1584, he was preſented to the living of Burſtow in Surry, which he enjoyed till he died in 1719. His *Hiſtoria cæleſtes Britannica* was publiſhed at London in 1725, in 3 vols. Mr Flamſteed likewiſe compoſed the Britiſh Catalogue of the fixed ſtars, which contains twice the number that are in the catalogue of Hevelius : to each of which he annexed its longitude, latitude, right aſcenſion, and diſtance from the pole, together with the variation of right aſcenſion and declination, while the longitude increaſes a degree. This catalogue, together with moſt of his obſervations, were printed on a fine paper and character, at the expence of the late prince George of Denmark.

FLANDERS, a province of the Netherlands, bounded by the German ſea and the United Provinces on the north, by the province of Brabant on the eaſt, by Hainault and Artois on the ſouth, and by another part of Artois and the German ſea on the weſt; being about 60 miles long, and 50 broad, and divided between the Auſtrians, the French, and the Dutch.

Flanders is a perfectly champaign country, with not a riſing ground or hill in it, and watered with many fine rivers and canals. Its chief commodities are fine lace, linen, and tapeſtry.

In this country ſome important arts were invented and improved. Weaving in general was greatly improved, and that of figures of all ſorts in linen were invented ; alſo the art of dyeing cloths and ſtuffs, and of oil-colours ; the curing of herrings, &c. The manufactures of this country are not now in the flouriſhing ſtate they were formerly ; yet ſilk, cotton, and woollen ſtuffs, brocades, camblets, tapeſtry, lace, and linen, are ſtill manufactured here in great quantities. This province had counts of its own from the ninth century to the year 1369, when it went by marriage to the dukes of Burgundy ; and afterwards from them, by marriage alſo, to the houſe of Auſtria. France, in 1667, ſeized the ſouthern part ; and the States-General obtained the northern partly by the treaty of Munſter, and partly by the barrier-treaty of 1715.

For a more particular hiſtory of Flanders, with a continuation down to the preſent times, ſee the article NETHERLANDS.

FLANEL, or FLANNEL, a kind of ſlight, looſe, woollen ſtuff, compoſed of a woof and warp, and wove on a loom with two treddles, after the manner of bays.

Dr Black aſſigns as a reaſon why flannel and other ſubſtances of the kind keep our bodies warm, that they compoſe a rare and ſpongy maſs, the fibres of which touch each other ſo ſlightly, that the heat moves ſlowly thro' the interſtices, which being filled only with air, and that in a ſtagnant ſtate, give little aſſiſtance in conducting the heat. Sir Benjamin Thomſon has inquired farther into the matter, and finds that there is a relation betwixt the power which the ſubſtances uſually worn as clothing have of abſorbing moiſture, and that of keeping our bodies warm. Having provided a quantity of each of theſe ſubſtances mentioned below, he expoſed them, ſpread out upon clean China plates, for the ſpace of 24 hours to the warm and dry air of a room which had been heated by a German ſtove for ſeveral months, and during the laſt ſix hours had raiſed the thermometer to 85° of Fahrenheit ; after which he weighed equal quantities of the different ſubſtances with a very accurate balance. They were then ſpread out upon a China plate, and removed into a very large uninhabited room upon the ſecond floor, where they were expoſed 48 hours upon a table placed in the middle of the room, the air of which was at 45° of Fahrenheit. At the end of this ſpace they were weighed, and then removed into a damp cellar, and placed on a table in the middle of the vault, where the air was at the temperature of 45°, and which by the hygrometer ſeemed to be fully ſaturated with moiſture. In this ſituation they were ſuffered to remain three days and three nights ; the vault being all the time hung round with wet linen cloths, to render the air as completely damp as poſſible. At the end of three days they were weighed, and the weights at the different times were found as in the following table.

		Weight after being dried in the hot room.	Weight after coming out of the cold room.	Weight after remaining 72h. in the vault.
Sheeps wool		Parts 1000	1084	1163
Beaver's fur			1072	1125
The fur of a Ruſſian hare			1065	1115
Eeder down			1067	1112
Silk	Raw ſingle thread		1057	1107
	Ravellings of white taffety		1054	1103
Linen	Fine lint		1046	1102
	Ravellings of fine linen		1044	1082
Cotton wool			1043	1089
Ravellings of ſilver lace			1000	1000

On theſe experiments our author obſerves, that though linen, from the apparent eaſe with which it receives dampneſs from the atmoſphere, ſeems to have a much greater attraction for water than any other ; yet it would appear from what is related above, that thoſe bodies which receive water in its unelaſtic form with the greateſt eaſe, or are moſt eaſily wet, are not thoſe which in all caſes attract the moiſture of the atmoſphere with the greateſt avidity. " Perhaps (ſays he), the apparent dampneſs of linen to the touch, ariſes more from the eaſe with which that ſubſtance parts with the water it contains, than from the quantity of water it actually holds : in the ſame manner as a body appears hot to the touch, in conſequence of its parting freely with its heat ; while another body, which is really at the ſame temperature, but with-holds its heat with great obſtinacy, affects the ſenſe of feeling much leſs violently. It is well known that woollen cloths, ſuch as flanels, &c. worn next the ſkin, greatly promote inſenſible perſpiration. May not this ariſe principally from the ſtrong attraction which ſubſiſts between wool and the watery vapour which is continually iſſuing from the human body ? That it does not depend entirely on the warmth of that covering, is clear ; for the ſame degree of warmth produced by wearing more clothing of a different kind, does not produce the ſame effect. The perſpiration of the human body being abſorbed by a covering of flanel, it is immediately diſtributed through the whole thickneſs of that ſubſtance, and by that means expoſed, by a very large ſurface, to be carried off by the atmoſphere ; and the loſs of this watery vapour, which the flannel ſuſtains on the one ſide by evaporation, being immediately reſtored from the other, in conſequence of the ſtrong attraction between the flannel and this vapour, the pores of the ſkin are diſincumbered, and they are continually ſurrounded by a dry and ſalubrious atmoſphere."

Our author expreſſes his ſurpriſe, that the cuſtom of wearing flannel next the ſkin ſhould not have prevailed more univerſally. He is confident it would prevent a number of diſeaſes; and he thinks there is no greater luxury that the comfortable ſenſation which ariſes from wearing it, eſpecially after one is a little accuſtomed to it. "It is a miſtaken notion (ſays he), that it is too warm a clothing for ſummer. I have worn it in the hotteſt climates, and at all ſeaſons of the year; and never found the leaſt inconvenience from it. It is the warm bath of a perſpiration confined by a linen ſhirt, wet with ſweat, which renders the ſummer heats of ſouthern climates ſo inſupportable; but flanel promotes perſpiration, and favours its evaporation; and evaporation, as is well known, produces poſitive cold.

It has been obſerved that new flanel, after ſome time wearing, acquires the property of ſhining in the dark, but loſes it on being waſhed. *Philoſ. Tranſ.* n° 483. § 7.

FLANK, or FLANC, in the manege, is applied to the ſides of a horſe's buttocks, &c. In a ſtrict ſenſe, the flanks of a horſe are the extremes of the belly, where the ribs are wanting, and are below the loins.

The flanks of a horſe ſhould be full, and at the top of each a feather. The diſtance between the laſt rib and haunch bone, which is properly the flank, ſhould be ſhort, which they term *well coupled*, ſuch horſes being moſt hardy, and fit to endure labour.

A horſe is ſaid to have no flank if the laſt of the ſhort ribs be at a conſiderable diſtance from the haunch-bone; as alſo when his ribs are too much ſtraightened in their compaſs.

FLANK, in war, is uſed by way of analogy for the ſide of a battalion, army, &c. in contradiſtinction to the *front* and *rear*.

To attack the enemy in flank, is to diſcover and fire upon them on one ſide. See FILE.

FLANK, in fortification, is a line drawn from the extremity of the face towards the inſide of the work.

Or, flank is that part of a baſtion which reaches from the curtain to the face, and defends the oppoſite face, the flank, and the curtain. See FORTIFICATION.

FLAT, in ſea-language, denotes a level ground lying at a ſmall depth under the ſurface of the ſea, and is called a *ſhoal* or *ſhallow*.

FLAT-bottomed Boats are ſuch as are made to ſwim in ſhallow water, and to carry a great number of troops, artillery, ammunition, &c. They are conſtructed with a 12 pounder, bow-chaſe, and an 18 pounder, ſtern-chaſe; their keel is from 90 to 100 feet, and from 12 to 24 feet beam: they have one maſt, a large ſquare mainſail, and a jib-ſail; are rowed by 18 or 20 oars, and can carry 400 men each. The gun takes up one bow, and a bridge the other over which the troops are to march. Thoſe that carry horſes have the fore-part of the boat made to open when the men are to mount and ride over a bridge.

FLATMAN (Thomas), an Engliſh poet of ſome repute, born at London about the year 1633. He ſtudied at the Inner-Temple, and became a barriſter, but it does not appear that he ever practiſed; for having a turn for the fine arts, he gave a looſe to his inclination that way, and acquired reputation, both as a poet and a painter. He publiſhed, in 1682, a third edition of his poems and ſongs dedicated to the duke of Ormond, with a print of himſelf as a frontiſpiece: he alſo publiſhed a ſatirical romance in proſe, on Richard Cromwell, ſoon after the reſtoration; which took greatly at that turn of affairs. He died about 1688.

FLATS, in muſic. See INTERVAL.

FLATUS, FLATULENCE, in medicine; vapours generated in the ſtomach and inteſtines, chiefly occaſioned by a weakneſs of theſe parts. They occaſion diſtenſions, uneaſy ſenſation, and ſickneſs, and often a conſiderable degree of pain. See (the *Index* ſubjoined to) MEDICINE.

FLAVEL (John), an eminent nonconformiſt miniſter, was educated at Univerſity-college, in Oxford: and became miniſter of Deptford, and afterwards of Dartmouth in Devonſhire, where he reſided the greateſt part of his life, and was admired for his preaching. Though he was generally reſpected at Dartmouth; yet, in 1685, ſeveral of the aldermen of that town, attended by the rable, carried about a ridiculous effigy of him, to which were affixed the Bill of Excluſion and the Covenant. Upon this occaſion, he thought it prudent to withdraw from the town; not knowing what treatment he might meet with from a riotous mob, headed by magiſtrates who were themſelves among the loweſt of mankind. Part of his Diary, printed with his Remains, muſt give the reader a high idea of his piety. He died in 1691, aged 61; and after his death, his works, which conſiſted of many pieces of practical divinity, were printed in two volumes folio. Among theſe, the moſt famous are his "Navigation Spiritualized, or a New Compaſs for Seamen, conſiſting of 32 points of pleaſant obſervations and ſerious reflections," of which there have been ſeveral editions in 8vo; and his "Huſbandry Spiritualized, &c. with occaſional meditations upon beaſts, birds, trees, flowers, rivers and ſeveral other objects," of which alſo there have been many editions in actavo.

FLAX, in botany. See LINUM.

The following particulars with regard to the manner of raiſing flax, has been for ſome years paſt warmly recommended by the truſtees for fiſheries, manufactures, and improvements in Scotland.

Of the choice of the Soil, and preparing the Ground for Flax. A ſkilful flax-raiſer always prefers a free open deep loam, and all grounds that produced the preceding year a good crop of turnip, cabbage, potatoes, barley, or broad clover; or have been formerly laid down rich, and kept for ſome years in paſture.

A clay ſoil, the ſecond or third crop after being limed, will anſwer well for flax; provided, if the ground be ſtill ſtiff, that it be brought to a proper mould, by tilling after harveſt, to expoſe it to the winter froſts.

All new grounds produce a ſtrong crop of flax, and pretty free of weeds. When a great many mole-heaps appear upon new ground, it anſwers the better for flax after one tilling.

Fax-ſeed ought never to be ſown on grounds that are either too wet or dry; but on ſuch as retain a natural moſture: and ſuch grounds as are inclined to weeds ought to be avoided, unleſs prepared by a careful ſummer-fallow.

If the lint-ſeed be ſown early, and the flax not allowed to ſtand for ſeed, a crop of turnip may be got after the flax that very year; the ſecond year a crop of bear or barley may be taken; and the third year, graſs-ſeeds are ſometimes ſown along with the lintſeed. This is the method moſtly practiſed in and about the counties of Lincoln and Somerſet, where great quantities of flax and hemp are every year raiſed, and where theſe crops have long been capital articles. There, old ploughed grounds are never ſowed with lintſeed, unleſs the ſoil be very rich and clean. A certain worm, called in Scotland the *coup-worm*, abounds in new-broke up grounds, which greatly hurts every crop but flax. In ſmall incloſures ſurrounded with trees or high hedges, the flax for want of free air, is ſubject to fall before it be ripe, and the droppings of rain and dew from the trees prevent the flax within the reach of the trees from growing to any perfection.

Of preceding crops, potatoes and hemp are the beſt preparation for flax. In the fens of Lincoln, upon proper ground of old tillage, they ſow hemp, dunging well the firſt year; the ſecond year hemp without dung; the third year flax without dung; and that ſame year, a crop of turnip eat on the ground by ſheep; the fourth year, hemp with a large coat of dung; and ſo on for ever.

If the ground be free and open, it ſhould be but once ploughed; and that as ſhallow as poſſible, not deeper than 2½ inches. It ſhould be laid flat, reduced to a fine garden mould by much harrowing, and all ſtones and ſods ſhould be carried off.

Except a little pidgeon's dung for cold or ſour ground, no other dung ſhould be uſed preparatory for flax; becauſe it produces too many weeds, and throws up the flax thin and poor upon the ſtalk.

Before ſowing, the bulky clods ſhould be broken, or carried off the ground; and ſtones, quickenings, and every other thing that may hinder the growth of the flax, ſhould be removed.

Of the choice of Lintſeed. The brighter in colour, and heavier the ſeed is, ſo much the better; that which when bruiſed appears of a light or yellowiſh green, and freſh in the heart, oily and not dry, and ſmells and taſtes ſweet, and not fuſty, may be depended upon.

Dutch ſeed of the preceding year's growth, for the moſt part, anſwers beſt; but it ſeldom ſucceeds if kept another year. It ripens ſooner than any other foreign ſeed. Philadelphia-ſeed produces fine lint and few bolls, becauſe ſown thick, and anſwers beſt in wet cold ſoils. Riga-ſeed produces coarſer lint, and the greateſt quantity of ſeed. Scots-ſeed, when well winned and kept, and changed from one kind of ſoil to another, ſometimes anſwers pretty well; but ſhould be ſown thick, as many of its grains are bad, and fail. It ſprings well, and its flax is ſooner ripe than any other; but its produce afterwards is generally inferior to that from foreign ſeed.

A kind has been lately imported, called *memmel-ſeed*; which looks well, is ſhort and plump, but ſeldom grows above eight inches, and on that account ought not to be ſown.

Of Sowing Lintſeed. The quantity of lintſeed ſown ſhould be proportioned to the condition of the ſoil; for if the ground be in good heart, and the ſeed ſown thick, the crop will be in danger of falling before it is ready for pulling. From 11 to 12 pecks Linlithgow meaſure of Dutch or Riga ſeed, is generally ſufficient for one Scots acre; and about ten pecks of Philadelphia ſeed, which, being the ſmalleſt grained, goes fartheſt. Riga lintſeed, and the next year's produce of it, is preferred in Lincolnſhire.

The time for ſowing lintſeed is from the middle of March to the end of April, as the ground and ſeaſon anſwers; but the earlier the ſeed is ſown, the leſs the crop interferes with the corn-harveſt.

Late ſown lintſeed may grow long, but the flax upon the ſtalk will be thin and poor.

After ſowing, the ground ought to be harrowed till the ſeed is well covered, and then (ſuppoſing the ſoil, as beforementioned, to be free and reduced to a fine mould) it ought to be rolled.

When a farmer ſows a large quantity of lintſeed, he may find it proper to ſow a part earlier and part later, that in the future operations of weeding, pulling, watering, and graſſing, the work may be the eaſier and more conveniently gone about.

It ought always to be ſown on a dry bed.

Of Weeding FLAX. It ought to be weeded when the crop is about four inches long. If longer deferred, the weeders will ſo much break and crook the ſtalks, that they never perhaps will recover their ſtraightneſs again; and when the flax grows crooked, it is more liable to be hurt in the rippling and ſwingling.

Quicken-graſs ſhould not be taken up; for, being ſtrongly rooted, the pulling of it always looſens a deal of the lint.

If there is an appearance of a ſettled drought, it is better to defer the weeding, than by that operation to expoſe the tender roots of the flax to the drought.

How ſoon the weeds are got out, they ought to be carried off the field, inſtead of being laid in the furrows, where they often take root again, and at any rate obſtruct the growth of the flax in the furrows.

Of Pulling FLAX. When the crop grows ſo ſhort and branchy, as to appear more valuable for ſeed than flax, it ought not to be pulled before it be thoroughly ripe; but if it grows long and not branchy, the ſeed ſhould be diſregarded, and all the attention given to the flax. In the laſt caſe it ought to be pulled after the bloom has fallen, when the ſtalk begins to turn yellow, and before the leaves fall, and the bolls, turn hard and ſharp-pointed.

When the ſtalk is ſmall, and carries few bolls, the flax is fine; but the ſtalk of courſe flax is groſs, rank, branching, and carries many bolls.

When the flax has fallen, and lies; ſuch as lies ought to be immediately pulled, whether it has grown enough or not, as otherwiſe it will rot altogether.

When parts of the ſame field grow unequally, ſo that ſome parts are ready for pulling before other parts; only what is ready ſhould be pulled, and the reſt ſhould be ſuffered to ſtand till ready.

The flax-raiſer ought to be at pains to pull, and keep by itſelf, each different kind of lint which he finds in his field; what is both long and fine, by itſelf; what is both long and coarſe, by itſelf; what is both ſhort and fine, by itſelf; what is both ſhort and coarſe, by itſelf; and in like manner every other kind by itſelf that is of the ſame ſize and quality. If the different kinds be not thus kept ſeparate, the flax muſt be much damaged in the watering and the other ſucceeding operations.

What is commonly called *under growth* may be neglected as uſeleſs.

Few perſons that have ſeen pulled flax, are ignorant of the method of laying it in handfuls acroſs each other; which gives the flax ſufficient air, and keeps the handfuls ſeparate and ready for the rippler.

Of Stacking up FLAX *during the Winter, and Winning the Seed.* If the flax be more valuable than the ſeed, it ought by no means to be ſtacked up; for its own natural juice aſſiſts it greatly in the watering; whereas, if kept long unwatered, it loſes that juice, and the harle adheres ſo much to the boon, that it requires longer time to water, and even the quality of the flax becomes thereby harſher and coarſer. Beſides, the flax ſtacked up over year, is in great danger from vermin and other accidents; the water in ſpring is not ſo ſoft and warm as in harveſt: and near a year is thereby loſt of the uſe of the lint: but if the flax be ſo ſhort and branchy as to appear moſt valuable for ſeed, it ought, after pulling, to be ſtooked and dried upon the field, as is done with corn; then ſtacked up for winter, rippled in ſpring; and after ſheeling, the ſeed ſhould be well cleaned from bad ſeeds, &c.

Of Rippling FLAX. After pulling, if the flax is to be regarded more than the ſeed, it ſhould be allowed to lie ſome hours upon the ground to dry a little, and ſo gain ſome firmneſs, to prevent the ſkin or harle, which is the flax, from rubbing off in the rippling; an operation which ought by no means to be neglected, as the bolls, if put into the water along with the flax, breed vermin there, and otherwiſe ſpoil the water. The bolls alſo prove very inconvenient in the graſſing and breaking.

In Lincolnſhire and Ireland, they think that rippling hurts the flax; and therefore, in place of rippling, they ſtrike the bolls againſt a ſtone.

The handfuls for rippling ſhould not be great, as that endangers the lint in the rippling comb.

After rippling, the flax-raiſer will perceive, that he is able to aſſort each ſize and quality of the flax by itſelf more exactly than he could before.

Of Watering FLAX. A running ſtream waſtes the lint, makes it white, and frequently carries it away. Lochs, by the great quantity and motion of the water, alſo waſte and whiten the flax, though not ſo much as running ſtreams. Both rivers and lochs water the flax quicker than canals.

But all flax ought to be watered in canals, which ſhould be digged in clay ground if poſſible, as that ſoil retains the water beſt: but if a firm retentive ſoil cannot be got, the bottom or ſides of the canal, or both the bottom and ſides, may be lined with clay; or inſtead of lining the ſides with clay, which might fall down, a ditch may be dug without the canal, and filled with clay, which will prevent both extraneous water from entering, and the water within from running off.

A canal of 40 feet long, ſix broad, and four deep, will generally water the growth of an acre of flax.

It ought be filled with freſh ſoft water from a river or brook, if poſſible two or three weeks before the flax is put in, and expoſed all that time to the heat of the ſun. The greater way the river or brook has run, the ſofter, and therefore the better, will the water be. Springs, or ſhort-runs from hills, are too cold, unleſs the water is allowed to ſtand long in the canal. Water from coal or iron is very bad for flax. A little of the powder of galls thrown into a glaſs of water, will immediately diſcover if it comes from minerals of that kind, by turning it into a dark colour, more or leſs tinged in proportion to the quantity of vitriol it contains.

The canal ought not to be under ſhade; which, beſides keeping the ſun from ſoftening the water, might make part of the canal cooler than other parts, and ſo water the flax unequally.

The flax-raiſer will obſerve, when the water is brought to a proper heat, that ſmall plants will be riſing quickly in it, numbers of ſmall inſects and reptiles will be generated there, and bubbles of air riſing on the ſurface. If no ſuch ſigns appear, the water muſt not be warm enough, or is otherwiſe unfit for flax.

Moſs-holes, when neither too deep nor too ſhallow, frequently anſwer well for watering flax, when the water is proper, as before deſcribed.

The proper ſeaſon for watering flax is from the end of July to the end of Auguſt.

The advantage of watering flax as ſoon as poſſible after pulling, has been already mentioned.

The flax being ſorted after rippling, as before-mentioned, ſhould next be put in beets, never larger than a man can graſp with both his hands, and tied very ſlack with a band of a few ſtalks. Dried ruſhes anſwer exceedingly well for binding flax, as they do not rot in the water, and may be dried and kept for uſe again.

The beets ſhould be put into the canals ſlop-ways, or half ſtanding upon end, the root-end uppermoſt. Upon the crop-ends, when uppermoſt, there frequently breeds a deal of vermin, deſtructive of the flax, which is effectually prevented by putting the crop-end downmoſt.

The whole flax in the canal ought to be carefully covered from the ſun with divots; the graſſy ſide of which ſhould be next the flax, to keep it clean. If it it is not thus covered, the ſun will diſcolour the flax, though quite covered with water. If the divots are not weighty enough to keep the flax entirely under water, a few ſtones may be laid above them. But the flax ſhould not be preſſed to the bottom.

When the flax is ſufficiently watered, it feels ſoft to the gripe, and the *harle* parts eaſily with the *boon* or *ſhow*, which laſt is then become brittle, and looks whitiſh. When theſe ſigns are found, the flax ſhould be taken out of the water, beet after beet; each gently rinſed in the water, to cleanſe it of the naſtineſs which has gathered about it in the canal: and as the lint is then very tender, and the beet ſlackly tied, it muſt be carefully and gently handled.

Great care ought to be taken that no part be overdone, and as the coarſeſt waters ſooneſt, if different kinds be mixed together, a part will be rotted, when the reſt is not ſufficiently watered.

When lint taken out of the canal is not found ſufficiently watered, it may be laid in a heap for 12, 18, or 24 hours, which will have an effect like more watering; but this operation is nice, and may prove dangerous in unſkilful hands.

After the flax is taken out of the canal, freſh lint ſhould not be put a ſecond time into it, until the former water be run off, and the canal cleaned, and ſupplied with freſh water.

Of graſſing F*LAX*. Short heath is the beſt field for graſſing flax; as, when wet, it faſtens to the heath, and is thereby prevented from being blown away by the wind. The heath alſo keeps it a little above the earth, and ſo expoſes it the more equally to the weather. When ſuch heath is not to be got, links or clean old lea-ground is the next beſt. Long-graſs grounds ſhould be avoided, as the graſs growing thro' the lint frequently ſpots, tenders, or rots it; and grounds expoſed to violent winds ſhould alſo be avoided.

The flax, when taken out of the water, muſt be ſpread very thin upon the ground; and being then very tender, it muſt be gently handled. The thinner it is ſpread the better, as it is then the more equally expoſed to the weather. But it ought never to be ſpread during a heavy ſhower, as that would waſh and waſte the harle too much, which is then exceſſively tender, but ſoon after becomes firm enough to bear the rains, which, with the open air and ſunſhine, cleans, ſoftens, and purifies the harle to the degree wanted, and makes it bliſter from the boon. In ſhort, after the flax has got a little firmneſs by being a few hours ſpread in dry weather, the more rain and ſunſhine it gets the better.

If there be little danger of high winds carrying off the flax, it will be much the better of being turned about once a-week. If it is not to be turned, it ought to be very thin ſpread. The ſpreading of flax and hemp requires a deal of ground, and enriches it greatly.

The ſkilful flax-raiſer ſpreads his firſt row of flax at the end of the field oppoſite to the point from whence the moſt violent wind commonly comes, placing the root-ends foremoſt; he makes the root-ends of every other row over-lap the crop-ends of the former row three or four inches, and binds down the laſt row with a rope; by which means the wind does not eaſily get below the lint to blow it away: and as the crop-ends are ſeldom ſo fully watered as the root-ends, the aforeſaid overlapping has an effect like giving the crop-ends, more watering. Experience only can fully teach a perſon the ſigns of flax being ſufficiently graſſed: then it is of a clearer colour than formerly: the harle is bliſtered up, and eaſily parts with the boon, which is then become very brittle. The whole ſhould be ſufficiently graſſed before any of it is lifted; for if a part be lifted ſooner than the reſt, that which remains is in great danger from the winds.

A dry day ought to be choſen for taking up the flax; and if there is no appearance of high wind, it ſhould be looſed from the heath or graſs, and left looſe for ſome hours, to make it thoroughly dry.

As a great quantity of flax can ſcarcely be all equally watered and graſſed, and as the different qualities will beſt appear at lifting the flax off the graſs; therefore at that time each different kind ſhould be gathered together, and kept by itſelf; that is, all of the ſame colour, length, and quality.

The ſmaller the beets lint is made up in, the better for drying, and the more convenient for ſtacking, houſing, &c. and in making up theſe beets, as in every other operation upon flax, it is of great conſequence that the lint be laid together as it grew, the root-ends together, and the crop-ends together.

Follows an eſtimate of the Expence, Produce, and Profit of a Scots Acre of F*LAX*,*—ſuppoſing the ſeaſon favourable, that no accidental loſſes happen, and that the farmer is neither unſkilful nor negligent.*

	A medium crop.	*A great crop.*	*An extra. crop.*
Ground-rent, labouring the ground, and leading the flax	L. 2 10 0	L. 3 10 0	L. 5 0 0
Lintſeed from L. 2. to L. 4. *per* hogſhead, the medium 3s. 4d. *per* peck — — —	1 16 8 for 11 pecks.	1 10 0 for 9 pecks.	1 6 8 for 8 pecks.
Clodding and ſowing — — —	0 2 0	0 2 0	0 2 0
Weeding — — — —	0 12 0	0 8 0	nothing.
Pulling, rippling, putting in, and covering in the water — — — —	0 14 0	0 15 0	1 0 0
Taking out of the water, graſſing, and ſtacking	0 8 0	0 12 0	0 18 0
Breaking and ſcutching, at 2 s. *per* ſtone —	3 0 0 for 30 ſtones.	4 0 0 for 40 ſtones.	6 0 0 for 60 ſtones.
Total expence	L. 9 2 8	L. 10 17 0	L. 14 6 8
Produce, at 10 s. *per* ſtone — —	L. 15 0 0 for 30 ſtones.	L. 20 0 0 for 40 ſtones.	L. 30 0 0 for 60 ſtones.
Lintſeed ſold for oil, at 1 s. *per* peck — —	0 16 0	0 18 0	1 0 0
The chaff of the bolls is well worth the expence of drying the ſeed; as it is good food, when boiled and mixed with beer, for horſes.			
Total produce	L. 15 16 0	L. 20 18 0	L. 31 0 0
Balance for profit — — —	L. 6 14 4	L. 10 1 0	L. 16 13 4

There is nothing ſtated here as expence of the canal in which the flax is watered; becauſe that varies much according to the conveniences people have for making it; and a canal once made requires for after years only to be repaired and cleanſed.

It is a certain fact, that the greater the crop is, the better is the quality of the ſame kind of flax.

The advantage of having both a crop of flax and a crop of turnip the ſame year—or of ſowing graſs-ſeeds along with the lintſeed—and of reducing the ground to a fine garden mould, free of weeds, ought to be attended to.

For Cambric and fine Lawn. The ground muſt be a rich light ſoil, rather ſandy, but cannot be too rich.

It ought to be ploughed in September, or the beginning of October, firſt putting a little hot rotten dung upon it. In January it ought to have a ſecond ploughing, after a hard froſt; and when ye intend to ſow it, plough it a third time, or rather hoe it, reducing the clods very fine; but make no furrows: the land muſt be made level like a garden: but never work the land when wet.

The ſeed ſhould be ſown the beginning of April, and about double the quantity that is generally ſown by our farmers; if the land be very rich, it will require rather more than double.

As ſoon as ſown (if the weather be dry) it will be neceſſary to roll the ground.

The lint muſt be weeded very clean when about three inches high; directly after which you muſt ſet forked ſticks, of about one-and-half inch thick (which ought to be prepared before), every four or five feet, according to the length of the poles you are to lay upon them; they ſhould be well fixed in the ground, the forked part to receive the poles about ſix or ſeven inches above the lint; each row of poles ſhould be two, three, or four feet aſunder, according to the length of the bruſhwood you are to lay upon them.

The poles ought to be from 10 to 15 feet long, and ſtrong enough to ſupport the bruſh acroſs the poles; take the longeſt bruſhwood you can get, the more branchy the better, very thick, filling up the vacancies with ſmaller bruſh, and any of the branches that riſe higher than 18 or 20 inches ought to be lopt off to make the bruſh lie as level as poſſible: any ſort of bruſh will do except oak, as that tinges the lint.

Your lint muſt be pulled as ſoon as the ſeed is fully formed, which is a few days after it is out of the bloom, before the lint turn yellow.

It muſt be pulled above the bruſhwood, and every handful laid upon it as ſoon as poſſible: if it is fine weather, leave it four or five hours in that manner; then carry it to a ſcreen near a barn, to put it under cover in caſe of rain; there it muſt be ſpread four or five days, and always put it in the barn at night, or when it appears to rain: the bundles muſt be opened in the barn, or made hollow, to prevent it from heating.

Theſe operations muſt be performed until the lint is perfectly dry, and out of danger of heating; taking care all the time to keep the roots as even as poſſible, and if poſſible keep it from rain or wet: if you cannot prevent it from being wet, it will be better to leave it on the graſs till dry; becauſe when once wet, the putting it under cover before dry will make it turn black; a thing which muſt be prevented at all events.

If any of the lint upon the border, or through the piece of ground, be coarſer than another, it muſt be ſeparated from the reſt.

The utmoſt care muſt be taken to preſerve the lint entire or unbroken; for this reaſon they beat off the ſeed with a round mell or bittle.

The moſt proper ground is ſummer fallow, or after potatoes or lea; if poſſible near a wood, to prevent the expence of carrying bruſh.

As ſoon as the ſeed is off, if you intend to water it that ſeaſon, it muſt be tied in bundles about as large as you can graſp with your two hands.

The water proper for it, is a very ſmall rivulet or ſoft ſpring free of any metallic ore; taking care that no flood or foul water enters your pit; which muſt be at leaſt five feet deep, about nine or ten broad at the top, and ſeven or eight at the bottom; the length will depend on the quantity of flax you have to water.—— A very ſmall ſtripe of water, when clear, ſhould always be running in and off from your pit when the lint is in it.

The pit ought to be made three or four months before it be uſed.

You muſt drive poles about four inches thick, with a hook inclining downwards, in this form 7, all along the ſides of the pit, above five feet aſunder. The hooks muſt be level with, or rather under, the ſurface of the water. A long pole, the whole length of the pit, muſt be fixed into theſe hooks on each ſide; and croſs poles put under that, to keep the lint under water; but the croſs poles are not uſed till the lint is put in. You muſt order it ſo, that all the lint ſhould be three or four inches under water. You next bring your lint to the ſides of the pit; then put your ſheaves head to head, cauſing each to overlap the other about one third, and take as many of theſe as make a bundle of two or two and a half feet broad, laying the one above the other till it is about four or four and a half feet high; then you tie them together in the middle, and at each root-end: after this you wrap your bundle in ſtraw, and lay it in the water, putting the thin or broad ſide undermoſt, taking care that none of your lint touch the earth; after it is fully preſſed under water, put in your croſs poles to keep it under. The bundles ought to lie in the pit a foot ſeparate from each other. This renders it eaſy to take out; for, if the bundles entangle, they will be too heavy to raiſe.

The time of watering depends ſo much upon the weather, and ſoftneſs or hardneſs of the water, that it is impoſſible to fix any certain time. This muſt be left to the ſkill of the farmer. If the flax be intended for ſpinning yarn ſoft and fit for cambric, it ought to be ſpread upon ſhort graſs for four or five days before you put it in the water; but if for lawns, lace, or thread, it is beſt to dry it outright. In either caſe, avoid as much as poſſible to let it get rain; as much rain blanches and waſhes out the oil, which is neceſſary to preſerve the ſtrength.

The great property of this flax is to be fine and long. Thick ſowing raiſes all plants fine and ſlender; and when the ground is very rich, it forces them to a great length. Pulling green prevents that coarſe hardneſs which flax has when let ſtand till it be full ripe, and gives it the fine ſilky property. The bruſhwood, when the flax ſprings up, catches it by the middle, prevents it from lying down and rotting; infallible conſequences of ſowing thick upon rich ground. It likewiſe keeps it ſtraight, moiſt, and ſoft at the roots; and by keeping it warm, and ſhaded from the ſun, greatly promotes its length. The keeping it from rain, heating, taking proper care of your water, preſerves the colour, and prevents thoſe bars in cloth ſo much complained of by bleachers.

FLAX-*Dreſſing*. For many ages it was the practice to ſeparate the boon or core from the flax, which is the bark of the plant, by the following ſimple *hand methods*. Firſt, for breaking the boon, the ſtalks in ſmall parcels were beat with a mallet; or, more dexterouſly, the *break* (Plate CXCIV. fig. 1. and 2.) was uſed thus: The flax being held in the left-hand acroſs the three *under-teeth* or *ſwords* of the break (*A*, fig. 1. and *a*, fig. 2.), the *upper-teeth* (*B*, fig. 1. and *b*, fig. 2.) were with the right hand quickly and often forced down upon the flax, which was artfully ſhifted and turned with the left hand. Next, for clearing the flax of the broken boon: the workman with his left-hand held the flax over the *ſtock* (fig. 3. and 4.), while with his right-hand he ſtruck or threſhed the flax with the *ſcutcher* (fig. 5.)

Theſe methods of breaking and ſcutching the flax being ſlow and very laborious, a *water-mill* was invented in Scotland about 40 years ago; which, with ſome late improvements, makes great diſpatch, and in ſkilful and careful hands gives ſatisfaction. It has been generally conſtructed to break the boon by three dented rollers, placed one above the other. The middle one of which, being forced quickly round, takes the other two along with it, and one end of the handfuls of the flax being by the workmen directed in between the upper and middle rollers, the flax is immediately drawn in by the rollers; a curved board or plate of tin behind the rollers directs the flax to return again between the middle and undermoſt rollers;—and thus the operation is repeated until the boon be ſufficiently broke. Great weights of timber or ſtone at the ends of levers, preſs the upper and under rollers towards the middle one.

The ſcutching is next carried on by the mill in the following manner: Four arms, ſomething like the hand-ſcutchers before deſcribed, project from a perpendicular axle; a box around the axle incloſes theſe projecting ſcutchers; and this box is divided among the workmen, each having ſufficient room to ſtand and handle his flax, which, through ſlits in the upper part and ſides of the box, they hold in to the ſtroke of the ſcutchers; which, moving round horizontally, ſtrike the flax acroſs or at right angles, and ſo threſh out or clear it of the boon.

The breaking of the flax by *rollers* is ſcarcely ſubject to any objection, but that it is dangerous to workmen not ſufficiently on their guard, who ſometimes allow the rollers to take hold of their fingers, and thereby their hole arm is inſtantly drawn in: thus many have loſt their arms. To avoid this danger, a break, upon the general principles of the hand-break before deſcribed, has been lately adapted to water-machinery, and uſed in place of rollers. The horizontal ſtroke of the ſcutchers was long thought too ſevere, and waſteful of the flax; but very careful experiments have diſcovered that the waſte complained of muſt be charged to the unſkilfulneſs or negligence of the workmen, as in good hands the mill carries away nothing but what, if not ſo ſcutched off, muſt be taken off in the heckling with more loſs both of time and flax. But to obviate this objection of the violence of the *horizontal ſcutchers*, an imitation of hand-ſcutching has lately been applied to water. The ſcutchers then project from an horizontal axle, and move like the arms of a check-reel, ſtriking the flax neither acroſs nor perpendicularly down, but ſloping in upon the parcel exactly as the flax is ſtruck by the hand-ſcutcher. This ſloping ſtroke is got by raiſing the ſcutching-ſtock ſome inches higher than the centre of the axle; and by raiſing or lowering the ſtock, over which the flax is held, or ſcrewing it nearer to or farther from the ſcutchers, the workman can temper or humour the ſtroke almoſt as he pleaſes.

A lint-mill, with horizontal ſcutchers upon a perpendicular axle, requires a houſe of two ſtories, the rollers or break being placed in the ground ſtory, and the ſcutchers in the loft above; but a mill with vertical ſcutchers on an horizontal axle, requires but one ground ſtory for all the machinery.

Another method of breaking and ſcutching flax, more expeditious than the old hand-methods, and more gentle than water-mills, has alſo been lately invented in Scotland. It is much like the break and ſcutcher giving the ſloping ſtroke laſt deſcribed, moved by the foot. The treddle is remarkably long, and the ſcutchers are fixed upon the rim of a fly-wheel. The foot-break is alſo aſſiſted in its motion by a fly. Theſe foot-machines are very uſeful where there are no water-mills, but they are far inferior to the mills in point of expedition.

The next operation that flax undergoes after ſcutching is heckling. The *heckle* (fig. 6.) is firmly fixed to a bench before the workman, who ſtrikes the flax upon the teeth of the heckle, and draws it through the teeth. To perſons unacquainted with that kind of work this may ſeem a very ſimple operation; but, in fact, it requires as much practice to acquire the ſlight of heckling well, and without waſting the flax, as any other operation in the whole manufacture of linen. They uſe coarſer and wider teethed heckles, or finer, according to the quality of the flax; generally putting the flax through two heckles, a coarſer one firſt, and next a fine one.

Flax for cambric and fine lawn, thread, and lace, is dreſſed in a manner ſomewhat different. It is not ſcutched ſo thoroughly as common flax; which from the ſcutch proceeds to the heckle, and from that to the ſpinner: whereas, this fine flax, after a rough ſcutching, is ſcraped and cleanſed with a blunt knife upon the workman's knee covered with his leather-apron; from the knife it proceeds to the ſpinner, who, with a bruſh made for the purpoſe, ſtraights and dreſſes each parcel juſt before ſhe begins to ſpin it.

The following obſervations, firſt publiſhed in the Gentleman's Magazine for June 1787, ſeem worthy of very particular attention, and may not therefore be improperly ſubjoined as a ſupplement to the preſent article.

Of the watering of Flax by a new method, ſo as to ſhorten labour, to add probably to the ſtrength of the flax, and to give it a much finer colour, which would render the operation of bleaching ſafer and leſs tedious.

“ Though the following reflections have for their object an improvement in the very eſſential article of watering of flax, yet I muſt advertiſe the reader, that they are only theory, and muſt depend entirely for their truth and juſtification upon future experiments, ſkilfully and judiciouſly made. Should repeated trials prove the advantage of the new method propoſed, we may venture to affirm, that it would be an improvement that would increaſe the national income in the agricultural branch many thouſand pounds annually, would add greatly to the perfection of the linen manufacture, and over and above would ſuppreſs a very diſagreeable nuiſance, which the preſent method of watering flax occaſions during ſome part of the ſummer in every flax-growing country.

“ The intention of watering flax is my opinion, to make the boon more brittle or friable, and, by ſoaking, to diſſolve that gluey kind of ſap that makes the bark of plants and trees adhere in a ſmall degree to the woody part. The bark of flax is called the *harle*; and when ſeparated from the uſeleſs woody part, the *boon*, this harle itſelf is called flax. To effect this ſeparation eaſily, the practice has long prevailed, of ſoaking the flax in water to a certain degree of fermentation, and afterwards drying it. For this ſoaking ſome prefer rivulets that have a ſmall current, and others ſtagnant water in ponds and lakes. In both methods the water acts as in all other caſes of infuſion and maceration; after two or three weeks it extracts a great many juices of a very ſtrong quality, which in ponds give the water an inky tinge and offenſive ſmell; and in rivulets mix in the ſtream and kill the fiſh. Nay, if this maceration be too long continued, the extracted and fermented ſap will completely kill the flax itſelf. For if, inſtead of two or three weeks, the new flax were to lie ſoaking in the water four or five months, I preſume it would be good for nothing but to be thrown upon the dunghill; both harle and boon would in time be completely rotted; yet the harle or flax, when entirely freed from this ſap, and manufactured into linen, or into ropes, might lie many months under water without being much damaged; as linen, it may be waſhed and ſteeped in ſcalding water twenty times without loſing much of its ſtrength; and as paper, it acquires a kind of incorruptibility.

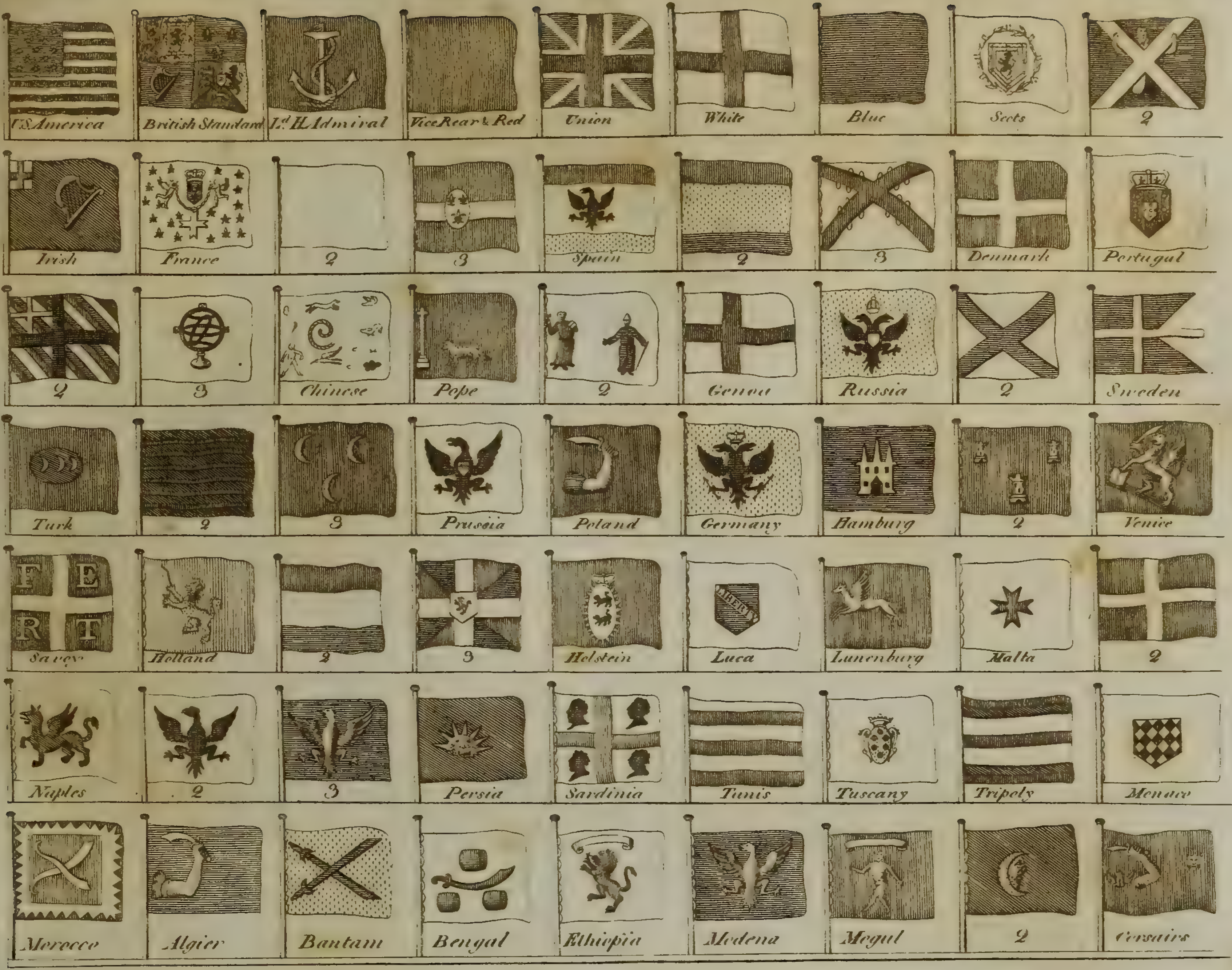
“ It appears then eſſential to the right management of new flax, to get rid of this pernicious vegetative ſap, and to macerate the boon; but from the complaints made againſt both the methods of watering now in uſe, there is reaſon to think that there is ſtill great room for improvement in that article. In rivulets, the vegetative ſap, as it is diſſolved, is carried off by the current, to the deſtruction of the fiſh. This prevents the flax from being ſtained; but the operation is tedious, and not complete, from the uncertainty of knowing when it is juſt enough, and not too much, or perhaps from neglect. In ponds, the inky tinge of the water often ſerves as a kind of dye to the flax, which imbibes it ſo ſtrongly, that double the labour in bleaching will hardly bring the linen made of ſuch flax to an equality in whiteneſs with linen made of flax untinged. This ſeems to be equally unwiſe as though we were to dye cotton black firſt, in order to whiten it afterwards. Theſe ponds, beſides, become a great nuiſance to the neighbourhood; the impregnated water is often of ſuch a pernicious quality, that cattle, however thirſty, will not drink of it; and the effluvia of it may perhaps be nearly as infectious as it is offenſive. If this effluvia is really attended with any contagious effects in our cold climate, a thing worth the enquiring into, how much more pernicious muſt its effects have been in the hot climate of Egypt, a country early noted for its great cultivation of flax?

“ I have often thought that the proceſs of watering might be greatly improved and ſhortened by plunging the new flax, after it is rippled, into ſcalding water; which, in regard to extracting the vegetative ſap, would do in five minutes more than cold water would do in a fortnight, or perhaps more than cold water could do at all, in reſpect to the clearing the plant of ſap. Rough almonds, when thrown into ſcalding water, are blanched in inſtant; but perhaps a fortnight's macerating thoſe almonds in cold water would not make them part ſo eaſily with their ſkins, which are the ſame to them as the harle is to the flax. Were tea leaves to be infuſed in cold water a fortnight, perhaps the tea produced by that infuſion would not be ſo good to the taſte, nor ſo ſtrongly tinged to the eye, as what is effected by ſcalding water in five minutes. By the ſame analogy, I think, flax or any ſmall twig would be made to part with its bark much eaſier and quicker by being dipped in boiling water than by being ſteeped in cold water.

“ This reflection opens a door for a great variety of new experiments in regard to flax. I would therefore recommend to gentlemen cultivators and farmers, to make repeated trials upon this new ſyſtem, which would ſoon aſcertain whether it ought to be adopted in practice or rejected. One thing, I think, we may be certain of, that if the Egyptians watered their flax in our common manner, they undoubtedly watered it in *very warm water*, from the great heat of their climate, which would probably make them neglect to think of water heated by any other means than that of the ſun. A good general practice can only be eſtabliſhed upon repeated trials. Though one experiment may fail, another with a little variation may ſucceed; and the importance of the object deſired to be obtained will juſtify a good degree of perſeverance in the proſecution of the means. In this view, as the Chineſe thread is ſaid to be very ſtrong, it would be worth while to be acquainted with the practice of that diſtant nation, in regard to the rearing and manufacturing of flax, as well as with the methods uſed by the Flemings and the Dutch.

“ Boiling water perhaps might at once clear the new flax from many impurities, which when not removed till it be ſpun into yarn, are then removed with difficulty, and with loſs of ſubſtance to the yarn. Why ſhould not the longitudinal fibres of the flax, before they be ſpun into yarn, be made not only as *fine* but as *clean* as poſſible? Upon the new ſyſtem propoſed, the act of bleaching would begin immediately after the rippling of the flax; and a little done then, might perhaps ſave much of what is generally done after the ſpinning and weaving. To ſpin dirty flax with a view

FLAGS



FLAX

Fig. 1 Flax hand break

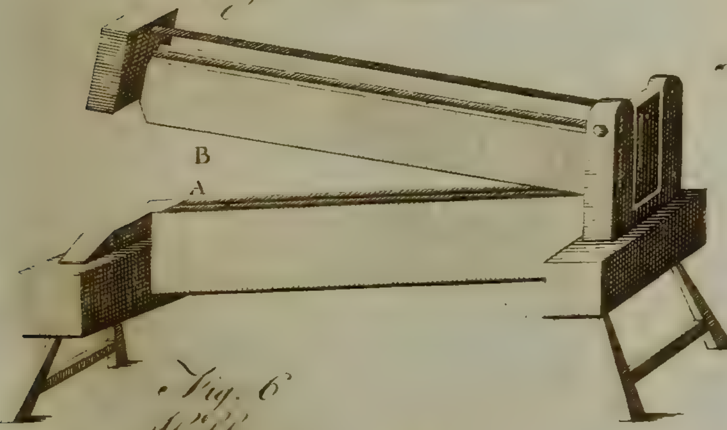


Fig. 2 Section of the break

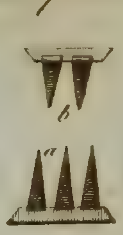


Fig. 5 Hand skutcher

Skutching stock

Fig. 3 Side view

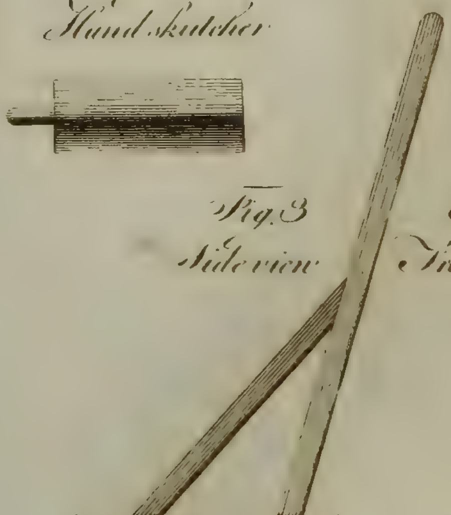


Fig. 4 Front view

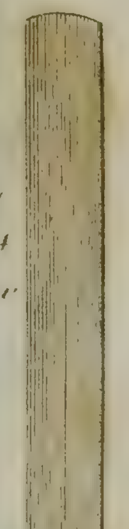


Fig. 6 Heckle

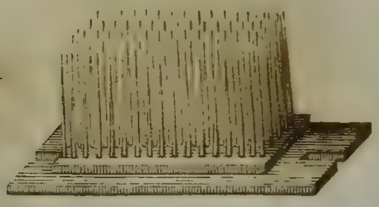
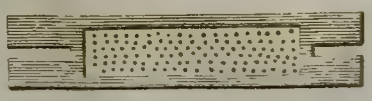


Fig. 7 Plan of the Heckle



Scot Philad^a.

of cleanſing it afterwards, appears to be the ſame impropriety as though we were to reſerve part of the dreſſing given to leather till after it is made into a glove.

"Should the plunging of the flax into the boiling water not ſuffice to make the boon brittle enough, as I am inclined to think it would not, then the common watering might be added; but in that caſe probably half the time uſually given to this watering would ſuffice, and the flax might then be laid in clear rivulets, without any apprehenſion of its infecting the water and poiſoning the fiſh, or of being diſcoloured itſelf; for the boiling water into which it had been previouſly put, would have extracted all the poiſonous vegetative ſap, which I preſume is what chiefly diſcolours the flax or kills the fiſh.

"On the ſuppoſition, that the uſe of boiling water in the preparation of flax may be found to be advantageous and profitable, I can recollect at preſent but one objection againſt its being generally adopted. Every flax grower, it may be ſaid, could not be expected to have conveniences for boiling water ſufficient for the purpoſe; the conſumption of water would be great; and ſome additional expence would be incurred. In anſwer to this, I ſhall obſerve, that I preſume any additional expence would be more than reimburſed by the better marketable price for the flax: for otherwiſe any new improvement, if it will not quit coſt, muſt be dropt, were it even the ſearching after gold. In a large cauldron a great deal of flax might be dipt in the ſame water, and the conſumption perhaps would not be more than a quart to each ſheaf. Even a large houſehold pot would be capable of containing one ſheaf after another; and I believe the whole objection would be obviated, were the practice to prevail with us, as in Flanders and Holland, that the flax-grower and the flax-dreſſer ſhould be two diſtinct profeſſions.

"I ſhall conclude with recommending to thoſe who are inclined to make experiments, not to be diſcouraged by the failure of one or two trials.—Perhaps the flax, inſtead of being juſt plunged into the ſcalding water ought to be kept in it five minutes, perhaps a quarter of an hour, perhaps a whole hour. Should five minutes, or a quarter of an hour, or an hour, not be ſufficient to make the boon and harle eaſily ſeparate, it might perhaps be found expedient to boil the flax for more than an hour; and ſuch boiling when in this ſtate might in return ſave ſeveral hours boiling in the article of bleaching. It is not, I think, at all probable that the boiling of the flax with the boon in it would prejudice the harle: for in the courſe of its future exiſtence, it is made to be expoſed 20 or 40 times to this boiling trial; and if not derimental in the one caſe, it is to be preſumed it would not be detrimental in the other. Perhaps, after the boiling, it would be proper to pile up the flax in one heap for a whole day, or for half a day, to occaſion ſome fermentation; or perhaps immediately after the boiling, it might be proper to waſh it with cold water. The great object, when the flax is pulled, is to get the harle from the boon with as little loſs and damage as poſſible; and if this is accompliſhed in a more complete manner than uſual, conſiderable labour and expence will be ſaved in the future manufacturing of the flax. On this account I think much more would be gained than loſt, were the two or three laſt inches of the roots of the ſtems to be chopped off, or clipt off, previous to the flax being either watered or boiled. When the flax is watered, care ſhould be taken not to ſpread it out to dry, when there is a hazard of its being expoſed in its wet ſtate to froſt."

Flax made to reſemble Cotton. In the Swediſh Tranſactions for the year 1747, a method is given of preparing flax in ſuch a manner as to reſemble cotton in whiteneſs and ſoftneſs, as well as in coherence. For this purpoſe a litle ſea-water is to be put into an iron pot or untinned copper kettle, and a mixture of equal parts of birch-aſhes and quicklime ſtrewed upon it: A ſmall bundle of flax is to be opened and ſpread upon the ſurface, and covered with more of the mixture, and the ſtratification continued till the veſſel is ſufficiently filled. The whole is then to be boiled with ſea-water for ten hours, freſh quantities of water being occaſionally ſupplied in proportion to the evaporation, that the matter may never become dry. The boiled flax is to be immediately waſhed in the ſea by a little at a time in a baſket with a ſmooth ſtick at firſt while hot; and when grown cold enough to be borne by the hands, it muſt be well rubbed, waſhed with ſoap, laid to bleach, and turned and watered every day. Repetitions of the waſhing with ſoap expedite the bleaching; after which the flax is to be beat, and again well waſhed: when dry, it is to be worked and carded in the ſame manner as common cotton, and preſſed betwixt two boards for 48 hours. It is now fully prepared and fit for uſe. It loſes in this proceſs near one half its weight, which is abundantly compenſated by the improvement made in its quality.

The filamentous parts of different vegetables have been employed in different countries for the ſame mechanic uſes as hemp and flax among us. See FILAMENT.

Earth-Flax. See AMIANTHUS.

New-Zealand Flax-Plant. See PHORMIUM.

Toad-Flax. See LINARIA.

FLEA, in zoology. See PULEX.

Flea-Bane, in botany. See CONYZA.

Flea-Bitten, that colour of a horſe which is white or grey, ſpotted all over with dark reddiſh ſpots.

FLEAM, in ſurgery and farriery, an inſtrument for letting blood of a man or horſe. A caſe of fleams, as it is called by farriers, comprehends ſix ſorts of inſtruments; two hooked ones, called *drawers*, and uſed for cleaning wounds; a pen-knife; a ſharp-pointed lancet for making inciſions; and two fleams, one ſharp and the other broad-pointed. Theſe laſt are ſomewhat like the point of a lancet, fixed in a flat handle, and no longer than is juſt neceſſary to open the vein.

FLECHIER (Eſpirt), biſhop of Niſmes, one of the moſt celebrated preachers of his age, and the publiſher of many panegyrics and funeral orations, was born at Perne in Avignon in 1632. He was nominated to the biſhopric of Lavaur in 1685, and tranſlated to Niſmes in 1687. At this latter place he founded an academy, and took the preſidentſhip upon himſelf: his own place was indeed a kind of academy, where he applied himſelf to train up orators and writers, who might ſerve the church, and do honour to the nation. He publiſhed, beſides his panegyrics and funeral orations, 1. An Hiſtory of the Emperor Theodoſius, that of Cardinal Ximenes, and that of Cardinal Commendon. 2. Several Sermons. 3. Miſcellaneous Works. 4. Letters, &c. He died in 1710.

FLECKNOE (Richard), an Engliſh poet in the reign of Charles II. more remarkable for Mr Dryden's ſatire on him than for any works of his own. He is ſaid to have been originally a jeſuit, and to have had good Engliſh connections in the Catholic intereſt. When Dryden loſt the place of poet-laureat on the revolution, its being conferred on Flecknoe, for whom he had a ſettled averſion, gave occaſion to his poem intitled *Mac Flecknoe*; one of the beſt written ſatires in our language, and from which Pope ſeems to have taken the hint for his Dunciad. Flecknoe, wrote ſome plays: but could never get more then one of them acted, and that was damned.

FLEECE, the covering of wool ſhorn off the bodies of ſheep. See WOOL.

Golden FLEECE. See ARGONAUTS, and *GOLDEN Fleece*.

FLEET, commonly implies a company of ſhips of war, belonging to any prince or ſtate; but ſometimes it denotes any number of trading ſhips employed in a particular branch of commerce.

The admirals of his Britannic majeſty's fleet are divided into three ſquadrons, *viz.* the red, the white, and the blue. When any of theſe officers are inveſted with the command of a ſquadron or detachment of men of war, the particular ſhips are diſtinguiſhed by the colours of their reſpective ſquadron: that is to ſay, the ſhips of the red ſquadron wear an enſign whoſe union is diſplayed on a red field; the enſigns of the white ſquadron have a white field; and thoſe of the blue ſquadron a blue field; the union being common to all three. The ſhips of war, therefore, are occaſionally annexed to any of the three ſquadrons, or ſhifted from one to another.

Of whatſoever number a fleet of ſhips of war is compoſed, it is uſually divided into three ſquadrons; and theſe, if numerous, are again ſeparated into diviſions. The admiral, or principal officer, commands the centre; the vice-admiral, or ſecond in command, ſuperintends the van-guard; and the operations of the rear are directed by the rear-admiral, or the officer next in rank. See the article DIVISION.

The diſpoſition of a fleet, while proceeding on a voyage, will in ſome meaſure depend on particular circumſtances; as the difficulty of the navigation, the neceſſity of diſpatch, according to the urgency or importance of the expedition, or the expectation of an enemy in the paſſage. The moſt convenient order is probably to range it into three lines or columns, each of which is parallel to a line cloſe-hauled according to the tack on which the line of battle is deſigned to be formed. This arrangement is more uſeful than any, becauſe it contains the advantages of every other form without their inconveniences. The fleet being thus more incloſed will more readily obſerve the ſignals, and with greater facility form itſelf into the line of battle; a circumſtance which ſhould be kept in view in every order of ſailing. See *Naval Tactics*.

FLEET, is alſo a noted priſon in London, where perſons are committed for contempt of the king and his laws, particularly of his courts of juſtice; or for debt, where any perſon will not or is unable to pay his creditors.

There are large rules and a warden belonging to the fleet priſon; which had its name from the float or fleet of the river or ditch, on the ſide whereof it ſtands.

FLEETWOOD (William), a very learned Engliſh biſhop in the beginning of the 18th century, of an ancient family in Lancaſhire. He diſtinguiſhed himſelf during king William's reign, by his *Inſcriptionum Antiquarum Sylloge*, by ſeveral ſermons he preached on public occaſions, and by his Eſſay on Miracles. He was deſigned by king William to a canonry of Windſor. The grant did not paſs the ſeals before the king's death; but the queen gave it him, and he was inſtalled in 1702. In 1703, he took a reſolution to retire; and in 1707, publiſhed, without his name, his *Chronicon Pretioſum*. In 1707, he was nominated by the queen to the ſee of St Aſaph. The change of the queen's miniſtry gave him much regret. In 1715, he publiſhed a pamphlet intitled "The 13th chapter of the Romans vindicated from the abuſive ſenſes put upon it." In 1714 he was tranſlated to the biſhopric of Ely; and died in 1723, aged 67. He publiſhed ſeveral other ſermons and tracts, and was a man of great learning and exemplary piety.

FLEMINGIANS, or FLANDRIANS, in eccleſiaſtical hiſtory, a ſect of rigid anabaptiſts, who acquired this name in the 16th century, becauſe moſt of them were natives of Flanders, by way of diſtinction from the WATERLANDIANS. In conſequence of ſome diſſenſions among the Flemingians relating to the treatment of excommunicated perſons, they were divided into two ſects, diſtinguiſhed by the appellations of *Flandrians* and *Frieſlanders*, who differed from each other in their manners and diſcipline. Many of theſe in proceſs of time came over to the moderate community of the Waterlandians, and theſe who remained ſeparate are ſtill know by the name of the Old Flemingians or Flandrians; but they are comparatively few in number. Theſe maintain the opinion of Menno with reſpect to the incarnation of Chriſt; alleging that his body was produced by the creating power of the Holy Ghoſt, and not derived from his mother Mary.

FLEMISH, or the FLEMISH TONGUE, is that which we otherwiſe call *Low Dutch*, to diſtinguiſh it from the *German*, whereof it is a corruption and a kind of dialect. See GERMAN.

It differs from the *Walloon*, which is a corruption of the French language. The Flemiſh is uſed through all the provinces of the Netherlands.

FLEMISH-Bricks, a neat, ſtrong, yellow kind of bricks, brought from Flanders, and commonly uſed in paving yards, ſtables, &c. being preferable for ſuch purpoſes to the common bricks. See the article BRICKS.

FLESH, in anatomy, a compound ſubſtance, conſiſting of the various ſofter ſolids of the animal body, and ſo denominated in contradiſtinction to bones. See ANATOMY, *paſſim*.

FLESH is alſo uſed, in theology, in ſpeaking of the myſteries of the incarnation and euchariſt. "The Word was made *fleſh*," *Verbum* caro *factum eſt*.

The Romaniſts hold, that the bread in the ſacrament of the ſupper is turned into the real fleſh of Jeſus Chriſt. See TRANSUBSTANTIATION.

FLESH is ſometimes alſo uſed by botaniſts for the ſoft pulpy ſubſtance of any fruit, incloſed between the outer rind or ſkin and the ſeeds or ſtone; or for that part of a root, fruit, &c. fit to be eaten.

FLESH-Colour. See CARNATION.

FLETA, the name given to an unknown writer who lived about the end of the reign of Edward II. and beginning of Edward III. and who being a priſoner in the Fleet, wrote there an excellent treatiſe on the common law of England.

FLETCHER. See *BEAUMONT and Fletcher.*

FLETCHER (Andrew) of Salton, a celebrated Scots patriot and political writer, was deſcended from an ancient family who trace their orign to one of the followers of William the Conqueror. He was the ſon of Sir Robert Fletcher of Salton and Innerpeffer, and born in the year 1650. The tuition of our author was committed by his father, on his death-bed, to Mr (afterwards Biſhop) Burnet, then his pariſh-miniſter; by whoſe care he received a pious, learned, and polite, education. Endowed with uncommon genius, and poſſeſſed of virtues and abilities peculiarly ſuited to the times in which he lived, Mr Fletcher quickly ſhone forth the ornament of his country, and the champion of its freedom. Having in the courſe of his claſſical ſtudies and hiſtorical reading been impreſſed with an enthuſiaſtic admiration both of ancient and modern republics, he had early contracted an ardent love of liberty, and an averſion to arbitrary rule. Hence his ſpirit the more readily took alarm at certain meaſures in the reign of Charles II. Being knight of the ſhire for Lothian to that parliament where the duke of York was commiſſioner, he openly oppoſed the deſigns of that prince and the bill of acceſſion. He had a ſhare with lord viſcount Stair in framing the teſt-act, by which the duke of York complained that he loſt Scotland. On theſe accounts he became peculiarly obnoxious to the duke; and was at length obliged to flee to Holland to avoid the fatal conſequences of proſecutions which on various pretences were commenced againſt him. Being ſummoned before the privy-council and juſticiary courts, and not appearing, he was declared traitor, and his eſtate confiſcated.

In Holland he and Mr Baillie of Jerviſwood were the only perſons whom the earl of Argyle conſulted concerning the deſigns which were then in agitation. In 1681 they came over to England, in order to concert matters with their party in that country; and were the only two who were intruſted ſo far as to be admitted to the ſecrets of lord Ruſſel's council of ſix. Mr. Fletcher managed his part of the negociation with ſo much addreſs, that adminiſtration could find no pretext for ſeizing him: nor could they fix upon him thoſe articles on account of which Mr Baillie was condemned; to whoſe honour let it be remembered, that although offered a pardon on condition of his accuſing his friend, he perſiſted in rejecting the propoſal with indignation.

Mr Fletcher having joined the duke of Monmouth upon his landing, received a principal command under him. But the duke was deprived of his ſervices on the following occaſion, as related by Sir John Dalrymple. Being ſent upon an expedition, and not eſteeming "times of danger to be times of ceremony, he had ſeized for his own riding the horſe of a country gentleman [the mayor of Lynne] which ſtood ready equipt for its maſter. The maſter, hearing this, ran in a paſſion to Fletcher, gave him opprobrious language, ſhook his cane, and attempted to ſtrike. Fletcher, though rigid in the duties of morality, yet having been accuſtomed to foreign ſervices both by ſea and land, in which he had acquired high ideas of the honour of a ſoldier and a gentleman, and of the affront of a cane, pulled out his piſtol, and ſhot him dead on the ſpot. The action was unpopular in countries where ſuch refinements were not underſtood. A clamour was raiſed againſt it among the people of the country: in a body they waited upon the duke with their complaints; and he was forced to deſire the only ſoldier, and almoſt the only man of parts, in his army, to abandon him. With Fletcher all Monmouth's chance of ſucceſs in war left him." But, in a manuſcript memoir belonging to the family, we have the following notice concerning Mr Fletcher's connection with Monmouth, in which his ſeparation from that prince is very differently accounted for: "To lord Mariſchal Mr Fletcher explained the motives which induced him firſt to join, and afterwards abandon, the duke of Monmouth. The former he aſcribed to the duke's manifeſto in Scotland relating to religion, and in England to liberty. For the latter he accounted by the diſguſt produced in his own mind and that of his aſſociates, when the duke declared himſelf king, and broke faith with all who embarked with him on his principles. He complained heavily of the account commonly given of the death of the mayor of Lynne; and mentioned to lord Mariſchal, in proof of the contrary, that he did not leave the duke till he came to Taunton, where he was proclaimed king, ſeveral weeks after the death of the mayor of Lynne."

Memoirs of Great Britain and Ireland.

Seeing all the efforts of himſelf and his friends in favour of liberty fruſtrated at Taunton, he endeavoured to ſecure his own perſonal freedom by taking his paſſage in the firſt ſhip bound to a foreign country. It was his misfortune to land in Spain; where he was immediately arreſted, caſt into priſon, and guarded by three different bands of ſoldiers, till a veſſel ſhould be prepared to carry him a victim in chains to the court of London. But on the morning before the ſhip could ſail, whilſt he looked penſive through the bars that ſecured the window of his room, he was hailed by a venerable perſonage who made ſigns to ſpeak with him. The priſon-doors he found open; and whilſt his friendly conductor waved to him to follow him, he paſſed thro' three different guards of ſoldiers all faſt aſleep. Without being permitted to offer his thanks to his deliverer, he found himſelf obliged to proſecute with all ſpeed the journey, in which he was directed by a perſon concerning whom he could never collect any information; and in diſguiſe he proceeded in ſafety through Spain. He felt a peculiar pleaſure in relating to his friends inſtances of the care of Providence which he had experienced during his exile; and entertained them often with narratives of this kind, which he always mingled

Memoirs of the family of Salton.

with religious reflections. Of theſe, another may be here mentioned. Happening in the evening to paſs the ſkirt of a wood at a few miles diſtance from a city where he intended to lodge, he came to a place where two roads met. After he had entered upon the road on the right, he was accoſted by a female of a reſpectable figure, who warned him to turn back, and take the road on the left; for that in the other there was danger which he could not eſcape if he continued to proceed. His friendly monitor ſuddenly retired into the wood out of which ſhe had iſſued no leſs unexpectedly. Having arrived at the city, the inhabitants were ſoon after alarmed by an account of the robbery and murder of ſeveral travellers who that evening had fallen into the hands of a banditti upon the very way in which he had intended to travel. From theſe and other inſtances of preſervation from dangers, the devotion of his mind, habituated from infancy to an intercourſe with heaven, lead him to conclude that he was in a peculiar manner the care of Providence, and that in critical caſes his underſtanding received its direction from a ſupernatural impulſe.

During his exile, he maintained a frequent and extenſive correſpondence with the friends of liberty at home; and he partly employed himſelf in making a curious collection of books, which compoſe the beſt private library in Scotland. But his genius alſo prompted him to engage in more active employments. He repaired to Hungary, and ſerved ſeveral campaigns as a volunteer under the duke of Lorrain with great reputation. At length, underſtanding that the great deſign then projecting in Holland, and upon the iſſue of which he conſidered the liberties of Britain to be ſuſpended, had attained a conſiderable degree of maturity he haſtened thither; where his counſels and addreſs were of eminent ſervice. He came over with king William; and in zeal, activity, penetration, and political ſkill, proved inferior to none of the leaders in the Revolution.

Such, however, was his magnanimity, that from a ſurvey of King William's papers it appears, that while others laboured to turn this grand event to the emolument of themſelves and the aggrandiſement of their family, Mr Fletcher aſked nothing. His eſtate had been forfeited, and his houſe abandoned to military diſcretion; his fortune was greatly ſhattered, and his family reduced to circumſtances of diſtreſs. Nothing was given him in recompence of all his ſuffering. On the contrary, he together with the duke of Hamilton was diſtinguiſhed by marks of royal and miniſterial diſlike. Still, whatever private reſentment he might entertain it appeared that his ruling principle was the good of his country; and that to this grand object of his heart he was willing to ſacrifice all perſonal conſiderations. For when, in 1692 the abdicated king meditated an invaſion, Mr Fletcher addreſſed a letter (preſerved in Sir John Dalrymple's Collection) to the duke of Hamilton, in which every argument is employed with ſkill and energy to engage his Grace to forget his injuries, and in the preſent criſis to employ the extenſive influence and authority he then poſſeſſed in the cauſe of freedom and of his country. This letter produced its full effect; and the duke returned to his duty, from which he had in part begun to deviate.

To follow our author through all the mazes of his political life ſubſequent to the Revolution, is beyond our purpoſe, and would exceed our limits. One or two circumſtances more ſhall therefore ſuffice. Being elected a member for the parliament 1683, he ſhowed an uniform zeal for the intereſt of his country. The thought of England's domineering over Scotland was what his generous ſoul could not endure. The indignities and oppreſſion which Scotland lay under galled him to the heart; ſo that in his learned and elaborate diſcourſes, he expoſed them with undaunted courage and pathetical eloquence.—In that great event, the Union, he performed eſſential ſervice. He got the act of ſecurity paſſed, which declared that the two crowns ſhould not paſs to the ſame head till Scotland was ſecured in her liberties civil and religious. Therefore lord Godolphin was forced into the Union, to avoid a civil war after the queen's demiſe. Although Mr Fletcher diſapproved of ſome of the articles, and indeed of the whole frame of the Union; yet, as the act of ſecurity was his own work, he had all the merit of that important tranſaction.

We muſt not omit mentioning, that in the ardor of his political career Mr Fletcher forgot not the intereſts of the place that gave him birth. He eſteemed the education of youth one of the nobleſt objects of government. On this ſubject he wrote a treatiſe, ſtill extant, moſt characteriſtic of himſelf: and he eſtabliſhed at Salton a foundation for the ſame purpoſe, of great utility while it laſted.

This great man died at London in 1716, aged 66. His remains were conveyed to Scotland, and depoſited in the family vault at Salton.

That Mr Fletcher received neither honours nor emoluments from king William, may perhaps be in part attributed to himſelf; a circumſtance, however, which muſt add greatly to the luſtre of his character. His uncomplying virtue, and the ſternneſs of his principles, were ill calculated to conciliate courtly favour. He was ſo zealous an aſſertor of the liberties of the people, that he was too jealous of the growing power of all princes; in whom he thought ambition ſo natural, that he was not for truſting the beſt of kings with the power which ill ones might make uſe of againſt their ſubjects: he was of opinion that all princes were made by, and for the benefit of, the people; and that they ſhould have no power but that of doing good. This, which made him oppoſe king Charles and invade king James, led him alſo to oppoſe the giving ſo much power to king William, whom he would never ſerve after his eſtabliſhment. So we are told by the author of Short Political Characters, a MS. in the library of the late T. Rawlinſon, Eſq.—Mr Lockhart, in his Memoirs, p. 72. expreſſes a belief that his averſion to the Engliſh and to the Union was ſo great, that, in revenge to them, he was inclined to ſide with the abdicated family: "But (adds he) as that was a ſubject not fit to be entered upon with him, this is only a conjecture from ſome inuendos I have heard him make; but ſo far is certain, he liked, commended, and converſed with high-flying Tories, more than any other ſet of men; acknowledging them to be the beſt countrymen, and of moſt honour, integrity, and ingenuity." It ſeems difficult to reconcile this with Mr Fletcher's avowed principles and the general tenor of his conduct. May we ſuppoſe, that chagrin, if not at the neglect or the ill treatment which he had himſelf received from government ſince the Revolution, yet at the public meaſures relating to his native country, might have occaſioned him to relent in his ſentiments with regard to the exiled family!—In the family-memoirs already quoted, we are informed, That "Lord Mariſchal held Mr Fletcher's character in high admiration;" and that, "when governor of Neufchatel, where Rouſſeau reſided about the year 1766, he prevailed with this extraordinary genius to write the life of a man whoſe character and actions he wiſhed to have tranſmitted to poſterity with advantage. For this purpoſe, his lordſhip applied to an honourable relation of Mr Fletcher's for materials, which by him were tranſmitted to Lord Mariſchal: but the deſign failed through Rouſſeau's deſultory and capricious diſpoſition." This anecdote muſt appear incompatible with the known loyalty and attachments of the Earl Mariſchal, unleſs we ſuppoſe him to have been privy to ſome ſuch ſentiments of Mr Fletcher as thoſe alluded to by Mr Lockhart: for how could we ſuppoſe him anxious to promote a compoſition, in which the taſk would be to celebrate principles diametrically oppoſite to his own, and to applaud actions ſubverſive of that royal family in whoſe cauſe he had ventured his life, and forfeited his fortune, and foregone his country!—But however theſe circumſtances may be reconciled,—as the integrity, diſintereſtedneſs, and public ſpirit of Mr Fletcher, have been univerſally acknowledged, there is reaſon to believe, that all his ſentiments and actions were founded in honour, and that he never once purſued a meaſure further than he judged it to be for the intereſt of his country.

Mr Fletcher was maſter of the Engliſh, Latin, Greek, French, and Italian languages; and well verſed in hiſtory, the civil law, and all kinds of learning. In his travels, he had not only acquired conſiderable knowledge in the art of war, but alſo became verſant in the reſpective intereſts of the ſeveral princes and ſtates of Europe. In private life he was affable to his friends, and free from all manner of vice. He had a penetrating, clear, and lively apprehenſion; but it is ſaid to have been too much wedded to opinions, and impatient of contradiction.—He poſſeſſed an uncommon elevation of mind, accompanied with a warmth of temper, which would ſuffer him to brook from no rank among men, nor in any place, an indignity. Of this he exhibited a ſingular proof in the Scots parliament. The earl of Stair, ſecretary of ſtate, and miniſter for Scotland, having in the heat of debate uſed an improper expreſſion againſt Mr Fletcher, he ſeized him by his robe, and inſiſted upon public and immediate ſatisfaction. His Lordſhip was obliged inſtantly to beg his pardon in preſence of parliament.

Mr Fletcher was by far the fineſt ſpeaker in the parliament of Scotland: the earl of Stair alone rivalled him. The latter was famed for a ſplendid, the former for a cloſe and nervous, eloquence. He formed his ſtyle on the models of antiquity; and the ſmall volume of his works, Sir John Dalrymple obſerves, tho' imperfectly collected, is one of the very few claſſical compoſitions in the Engliſh language.

FLETEWOOD (William), an eminent Engliſh lawyer and recorder of London, in the reign of queen Elizabeth. He was very zealous in ſuppreſſing maſs-houſes, and committing Popiſh prieſts: but once ruſhing in upon maſs at the Portugueſe ambaſſador's houſe, he was committed to the Fleet for breach of privilege, but ſoon releaſed. Mr Wood ſays, "He was a learned man, and a great antiquary, but of a marvellous merry and pleaſant conceit." He was a good popular ſpeaker, and wrote well upon ſubjects of government. His principal works are, 1. *Annalium tam regum Edwardi V. Richardi III. & Henrici VII. quam Henrici VIII.* 2. A Table of the Reports of Edmund Plowden. 3. The Office of a Juſtice of Peace. He died about the year 1593.

FLEVILLEA, in botany: a genus of the hexandria order, belonging to the diœcia claſs of plants. The male calyx and corolla are quinquefid; the ſtamina five; the nectarium five converging filaments. The female calyx is quinquefid; there are three ſtyli; fruit an hard trilocular barky apple.

FLEURI (Claude), one of the beſt French critics and hiſtorians of his age, was born at Paris in 1640. He applied himſelf to the law, was made advocate for the Parliament of Paris, and attended the bar nine years; he then entered into orders, and was made preceptor to the princes of Conti. In 1690, the king made him ſub-preceptor to the dukes of Burgundy, Anjou and Berry; and in 1706, when the education of theſe young princes was completed, the king gave him the priory of Argenteville belonging to the Benedictines in the dioceſe of Paris. In 1716, he was choſen counſellor to Louis XV. and died in 1723. He was the author of a great number of eſteemed French works; the principal of which are, 1. An eccleſiaſtical hiſtory, in 20 volumes, the laſt of which ends with the year 1414. 2. The manners of the Iſraelites and Chriſtians. 3. Inſtitutions of eccleſiaſtical law. 4. An hiſtorical catechiſm. 5. On the choice and method of ſtudy. 6. The duties of maſters and ſervants, &c.

Fleuri (Andrew Hercules de), biſhop of Frejus, preceptor to Louis XV. grand almoner to the queen, cardinal and miniſter of ſtate, was born in 1653, and died in 1743. He was an able negociator; and diſtinguiſhed himſelf during his miniſtry by his probity, his zeal for the happineſs of his country, and his pacific diſpoſition.

FLEXIBLE, in phyſics, a term applied to bodies capable of being bent or diverted from their natural figure or direction.

FLEXOR, in anatomy, a name applied to ſeveral muſcles, which are ſo called from their office, which is to bend the parts to which they belong; in oppoſition to the *extenſors*, which open or ſtretch them. See Anatomy, *Table of the Muſcles.*

FLIGHT, the act of a bird in flying: or the manner, duration, &c. thereof.

Almoſt every kind of bird has its particular flight: the eagle's flight is the higheſt; the flight of the ſparrow-hawk and vulture is noble, and fit for high enterpriſe and combat. The flight of ſome birds is low, weak, and tranſient; the flight of the partridge and pheaſant is but of ſhort continuance; that of the dove is laboured; that of the ſparrow undulatory, &c.

The augurs pretended to foretel future events from the flight of birds. See Augury.

Flight. In melting the lead-ore in the works at

Mendip, there is a ſubſtance which flies away in the ſmoke, which they call the flight. They find it ſweetiſh upon their lips, if their faces happen to be in the way of the ſmoke, which they avoid as much as poſſible. This falling on the graſs, kills cattle that feed thereon; and, being gathered, and carried home, kills rats and mice in their houſes; that which falls on the ſand, they gather, and melt upon a flag-hearth into ſhot and ſheet-lead.

FLINT, in natural hiſtory, a kind of ſemitranſparent or quite opaque ſtones; generally of a roundiſh form, and covered with white cruſt; of a ſmooth, uniform, ſhining texture; ſo hard, that they will ſtrike fire with ſteel; calcinable by fire, after which they become white, friable, and according to Henckel, heavier than before, and ſoluble by acids, vitrifiable only by the very violent heat of the largeſt ſpeculums, ſuch as that of Villette, and not even by the focus of one of Tſchirnhauſen's lenſes, according to an experiment of Neumann. They are found generally in beds of chalk and of ſand; but never forming entire ſtrata of rock as jaſper does. By long expoſure to air and the ſun, they ſeem to decay, to loſe their luſtre, their firmneſs of texture, and to be changed to a white calcareous earth or chalk. Hence they are almoſt always found covered with a white chalky cruſt. They are alſo convertible into a calcareous earth by fuſion, or vitrification with ſo much fixed alkali that they ſhall reſolve into a liquid maſs called the *liquamen* or *oil of flints*, and by precipitation from the fixed alkali by means of acids. See CHEMISTRY, n° 1069.

This genus of ſtones, or ſiliceous earth, Cronſtedt conſiders as of an intermediate nature between the quartz and jaſper; both of which it ſo nearly reſembles, that it is difficult to diſtinguiſh them. Our author characteriſes it in the following manner: 1. It is more uniformly ſolid and not ſo much cracked in the maſs as quartz, but more pellucid than the jaſper. 2. It bears the air better than the jaſper, but worſe than the quartz. 3. For the purpoſe of glaſs-making it is better than jaſper, but not quite ſo good as quartz. 4. Whenever it has had an opportunity of ſhooting into cryſtals, thoſe of quartz are always found in it; as if the quartz made one of its conſtituent parts, and had been ſqueezed out of it. This may be ſeen in every hollow flint and its clefts, which are always filled up with quartz. 5. It often ſhows moſt evident marks of having been originally in a ſoft and ſlimy tough ſtate like jelly.—To theſe properties the following are added by other authors. 7. When broken, it is ſcaly, generally unequal, and cracks into thin lamellæ. 8. In a calcining heat it becomes opaque, white, and milky.

Breaking of FLINTS. The art of cutting, or rather breaking, flint ſtones into uniform figures, is by ſome ſuppoſed to be one of the arts now loſt. That it was known formerly, appears from the ancient Bridewell at Norwich, from the gate of the Auguſtine friars at Canterbury, that of St John's Abbey at Colcheſter, and the gate near Whitehall, Weſtminſter. But that the art is not loſt, and that the French know it, appears from the platform on the top of the royal obſervatory at Paris, which, inſtead of being leaded, is paved with flint cut or broken into regular figures. But we know not that this art has been any where deſcribed.

FLINTS, in the glaſs-trade. The way of preparing flints for the niceſt operations in the glaſs-trade is this. Chooſe the hardeſt flints, ſuch as are black and will reſiſt the file, and will grow white when calcined in the fire. Cleanſe theſe of the white cruſt that adheres to them, then calcine them in a ſtrong fire, and throw them while red-hot into cold water; waſh off the aſhes that may adhere to them, and powder them in an iron mortar, and ſift them through a very fine ſieve; pour upon this powder ſome weak aquafortis, or the phlegm of aquafortis, to diſſolve and take up any particles of iron it may have got from the mortar; ſtir this mixture ſeveral times, then let it reſt, and in the morning pour of the liquor, and waſh the powder ſeveral times with hot water, and afterwards dry it for uſe. You will thus have a powder for making the pureſt glaſs as perfectly fine and faultleſs as if you had uſed rock-cryſtal itſelf.

The waſhing off the ferrugineous particles with aquafortis is not neceſſary when the glaſs intended to be made is to be tinged with iron afterwards; but when meant to be a pure white, this is the method that will ſecure ſucceſs.

FLINT, the chief town of Flintſhire, in North Wales. It is commodiouſly ſeated on the river Dee; and is but a ſmall place, though it ſends one member to parliament. It was formerly noted for its caſtle, where Richard II. took ſhelter on his arrival from Ireland; but having quitted it, he was taken priſoner by the duke of Lancaſter. The caſtle now is in a ruinous condition. This caſtle ſtands cloſe to the ſea on a rock, which in various parts forms ſeveral feet of its foundation. It covers about three quarters of an acre. The aſſizes are ſtill held in the town. It is 195 miles north-weſt of London.

FLINTSHIRE, a county of Wales, bounded on the north-eaſt and eaſt by an arm of the ſea, which is properly the mouth of the river Dee; on the north-weſt by the Iriſh ſea; and on the ſouth ſouth-weſt and weſt by Denbighſhire. It is the leaſt of all the counties in Wales, being but 33 miles in length and 9 in breadth. It is divided into five hundreds; in which are two market-towns, and 28 pariſhes, with 32,400 inhabitants. The greateſt part of this county lies in the dioceſe of St Aſaph, and the reſt belongs to that of Cheſter. It ſends two members to parliament, one for the county and one for Flint; and pays one part of the land-tax. The air is cold, but healthful. It is full of hills, intermixed with a few valleys, which are very fruitful, producing ſome wheat and plenty of rye. The cows, though ſmall, yield a great quantity of milk in proportion to their ſize, and are excellent beef. The mountains are well ſtored with lead, coal, and mill-ſtones. This county alſo produces good butter, cheeſe, and honey; of which laſt the natives make metheglin, a wholeſome liquor much uſed in theſe parts.

FLIP, a ſort of ſailors drink, made of malt liquor, brandy, and ſugar, mixed.

FLOAT, a certain quantity of timber bound together with rafters athwart, and put into a river to be conveyed down the ſtream; and even ſometimes to carry burdens down a river with the ſtream.

FLOAT-Boards, thoſe boards fixed to water-wheels of under-ſhot-mills, ſerving to receive the impulſe of the ſtream, whereby the wheel is carried round. See the articles WHEEL and MILL.

It is no advantage to have too great a number of float-boards; becauſe, when they are all ſtruck by the water in the beſt manner that it can be brought to come againſt them, the ſum of all the impulſes will be but equal to the impulſe made againſt one float-board at right angles, by all the water coming out of the penſtock through the opening, ſo as to take place on the float-board. The beſt rule in this caſe is, to have juſt ſo many, that each of them may come out of the water as ſoon as poſſible, after it has received and acted with its full impulſe. As to the length of the float-board, it may be regulated according to the breadth of the mill. See the article Mill.

Floats for Fiſhing. See *Fishing-Floats.*

FLOATAGES, all things floating on the ſurface of the ſea or any water: a word much uſed in the commiſſions of water-bailiffs.

Floating-Bridge. See Bridge.

Flock-Paper. See Paper.

FLOOD, a deluge or inundation of waters. See Deluge.

Flood is alſo uſed in ſpeaking of the tide. When the water is at loweſt, it is called *ebb;* when riſing, *young flood*; when at higheſt, *high flood*; when beginning to fall, *ebb-water.*

Flood-mark, the mark which the ſea makes on the ſhore at flowing water and the higheſt tide: it is alſo called *high-water mark.*

FLOOK of an anchor. See Anchor.

FLOOKING, among miners, a term uſed to expreſs a peculiarity in the load of a mine. The load or quantity of ore is frequently intercepted in its courſe by the croſſing of a vein of earth or ſtone, or ſome different metallic ſubſtance: in which caſe the load is moved to one ſide, and this tranſient part of the land is called a *flooking.*

FLOOR, in building, the underſide of a room, or that part we walk on.

Floors are of ſeveral ſorts; ſome of earth, ſome of brick, others of ſtone, others of boards, &c.

For brick and ſtone Floors, ſee Pavement.

For boarded Floors, it is obſervable, that the carpenters never floor their rooms with boards till the carcaſe is ſet up, and alſo incloſed with walls, leſt the weather ſhould injure the flooring. Yet they generally rough-plane their boards for the flooring before they begin any thing elſe about the building, that they may ſet them by to dry and ſeaſon, which is done in the moſt careful manner. The beſt wood for flooring is the fine yellow deal well ſeaſoned, which, when well laid, will keep its colour for a long while; whereas the white ſort becomes black by often waſhing, and looks very bad. The joints of the boards are commonly made plain, ſo as to touch each other only; but, when the ſtuff is not quite dry, and the boards ſhrink, the water runs through them whenever the floor is waſhed, and injures the ceiling underneath. For this reaſon they are made with feather edges, ſo as to cover each other about half an inch, and ſometimes they are made with groves and tenons; and ſometimes the joints are made with dove-tails; in which caſe the lower edge is nailed down and the next drove into it, ſo that the nails are concealed. The manner of meaſuring floors is by ſquares of 10 feet on each ſide, ſo that taking the length and breadth and multiplying them together and cutting off two decimals, the content of a floor in ſquare will be given. Thus 18 by 16 gives 288 or 2 ſquares and 88 decimal parts.

Earthen-Floors, are commonly made of loam, and ſometimes, eſpecially to make malt on, of lime, and brookſand, and gun-duſt, or anvil-duſt from the forge.

Ox-blood and fine clay, tempered together, Sir Hugh Plat ſays, make the fineſt floor in the world.

The manner of making earthen floors for plain country habitations is as follows: Take two thirds of lime, and one of coal-aſhes well ſifted, with a ſmall quantity of loam clay; mix the whole together, and temper it well with water, make it up into a heap: let it lie a week or ten days and then temper it over again. After this, heap it up for three or four days, and repeat the tempering very high, till it become ſmooth, yielding, tough, and gluey. The ground being then levelled, lay the floor therewith about 2½ or 3 inches thick, making it ſmooth with a trowel: the hotter the ſeaſon is, the better; and when it is thoroughly dried, it will make the beſt floor for houſes, eſpecially malt-houſes.

If any one would have their floors look better, let them take lime made of rag-ſtones, well tempered with whites of eggs, covering the floor about half an inch thick with it, before the under flooring is too dry. If this be well done, and thoroughly dried, it will look when rubbed with a little oil as tranſparent as metal or glaſs. In elegant houſes, floors of this nature are made of ſtucco, or of plaſter of Paris beaten and ſifted, and mixed with other ingredients.

Floor of a ſhip, ſtrictly taken, is only ſo much of her bottom as ſhe reſts on when aground.

Such ſhips as have long, and withal broad floors, lie on the ground with moſt ſecurity, and are not apt to heel, or tilt on one ſide; whereas others, which are narrow in the floor, or, in the ſea-phraiſe, *cranked by the ground,* cannot be grounded without danger of being overturned.

Floor-Timbers, in a ſhip, are thoſe parts of a ſhip's timbers which are placed immediately acroſs the keel, and upon which the bottom of the ſhip is framed; to theſe the upper parts of the timbers are united, being only a continuation of floor-timbers upwards.

FLORA, the reputed goddeſs of flowers, was, according to Lactantius, only a lady of pleaſure, who having gained large ſums of money by proſtituting herſelf, made the Roman people her heir, on condition that certain games called *Floralia* might be annually celebrated on her birth-day. Some time afterwards, however, ſuch a foundation appearing unworthy the majeſty of the Roman people, the ſenate, to ennoble the ceremony, converted Flora into a goddeſs, whom they ſuppoſed to preſide over flowers; and ſo made it part of religion to render her propitious, that it might be well with their gardens, vineyards, &c. But Voſſius (*de Idolol.* lib. i. c. 12) can by no means allow the goddeſs Flora to have been the courtezan abovementioned: he will rather have her a Sabine deity, and thinks her worſhip might have commenced under Romulus. His reaſon is, that Varro, in his fourth book of the Latin tongue, ranks Flora among the deities to whom Tatius king of the Sabines offered up vows before he joined battle with the Romans. Add, that from another paſſage in Varro it appears, that there were prieſts of Flora, with ſacrifices, &c. as early as the times of Romulus and Numa.

The goddeſs Flora was, according to the poets, the wife of Zephyrus. Her image in the temple of Caſtor and Pollux was dreſſed in a cloſe habit, and ſhe held in her hands the flowers of peaſe and beans: but the modern poets and painters have been more laviſh in ſetting off her charms, conſidering that no parts of nature offered ſuch innocent and exquiſite entertainment to the ſight and ſmell, as the beautiful variety which adorns, and the odour which embalms, the floral creation.

FLORALES ludi, or Floral Games, in antiquity, were games held in honour of Flora, the goddeſs of flowers.—They were celebrated with ſhameful debaucheries. The moſt licentous diſcourſes were not enough, but the courteſans were called together by the ſound of a trumpet, made their appearance naked, and entertained the people with indecent ſhows and poſtures; the comedians appeared after the ſame manner on the ſtage. Val. Maximus relates, that Cato being once preſent in the theatre on this occaſion, the people were aſhamed to aſk for ſuch immodeſt repreſentations in his preſence; till Cato, appriſed of the reſervedneſs and reſpect with which he inſpired them, withdrew, that the people might not be diſappointed of their accuſtomed diverſion. There were ſeveral other ſorts of ſhows exhibited on this occaſion; and if we may believe Suetonius in *Galba*, c. vi. and Vopiſcus in *Carinus*, theſe princes preſented elephants dancing on ropes on theſe occaſions.

The ludi florales, according to Pliny, lib. xviii. c. 29. were inſtituted by order of an oracle of the Sibyls, on the 28th of April; not in the year of Rome IↃXVI. as we commonly read it in the ancient editions of that author; nor in IↃXIV. as F. Hardouin has corrected it, but, as Voſſius reads it, in 513. Though they were not regularly held every year till after 580. They were chiefly held in the night-time, in the Patrician ſtreet: ſome will have it there was a circus for the purpoſe on the hill called Hortulorum.

FLORALIA, in antiquity, a general name for the feaſts, games, and other ceremonies, held in honour of the goddeſs Flora. See Flora and Florales *Ludi*.

FLORENCE, the capital of the duchy of Tuſcany, and one of the fineſt cities in Italy. It is ſurrounded on all ſides but one with high hills, which riſe inſenſibly, and at laſt join with the lofty mountains called the *Apennines*. Towards Piſa, there is a vaſt plain of 40 miles in length; which is ſo filled with villages and pleaſure-houſes, that they ſeem to be a continuation of the ſuburbs of the city. Independent of the churches and palaces of Florence, moſt of which are very magnificent, the architecture of the houſes in general is in a good taſte; and the ſtreets are remarkably clean, and paved with large broad ſtones chiſeled ſo as to prevent the horſes from ſliding. The city is divided into two unequal parts by the river Arno, over which there are no leſs than four bridges in ſight of each other. That called the *Ponte della Trinitá*, which is uncommonly elegant, is built entirely of white marble, and ornamented with four beautiful ſtatues repreſenting the Seaſons. The quays, the buildings on each ſide, and the bridges, render that part of Florence through which the river runs by far the fineſt. Every corner of this beautiful city is full of wonders in the arts of painting, ſtatuary, and architecture. The ſtreets, ſquares, and fronts of the palaces are adorned with a great number of ſtatues; ſome of them by the beſt modern maſters, Michael Angelo, Bandinelli, Donatello, Giovanni di Bologna, Benvenuto Cellini, and others. Some of the Florentine merchants formerly were men of vaſt wealth, and lived in a moſt magnificent manner. One of them, about the middle of the fifteenth century, built that noble fabric, which, from the name of its founder, is ſtill called the *Palazzo Pitti*. The man was ruined by the prodigious expence of this building, which was immediately purchaſed by the Medici family, and has continued ever ſince to be the reſidence of the ſovereigns. The gardens belonging to this palace are on the declivity of an eminence. On the ſummit there is a kind of fort, called *Beldevere*. From this, and from ſome of the higher walks, you have a complete view of the city of Florence, and the beauteous vale of Arno, in the middle of which it ſtands. This palace has been enlarged ſince it was purchaſed from the ruined family of Pitti. The furniture is rich and curious, particularly ſome tables of Florentine work, which are much admired. The moſt precious ornaments, however, are the paintings. The walls of what is called the *Imperial Chamber*, and painted in freſco, by various painters; the ſubjects are allegorical, and in honour of Lorenzo of Medicis diſtinguiſhed by the name of the *Magnificent*. The famous gallery attracts every ſtranger. One of the moſt intereſting parts of it, in the eyes of many, is the ſeries of Roman emperors, from Julius Cæſar to Gallienus, with a conſiderable number of their empreſſes, arranged oppoſite to them. This ſeries is almoſt complete; but wherever the buſt of an emperor is wanting, the place is filled up by that of ſome other diſtinguiſhed Roman. The celebrated Venus of Medici, which, take it all in all, is thought to be the ſtandard of taſte in female beauty and proportion, ſtands in a room called the *Tribunal*. The inſcription on its baſe mentions its being made by Cleomenes an Athenian, the ſon of Apollodorus. It is of white marble, and ſurrounded by other maſter-pieces of ſculpture, ſome of which are ſaid to be the works of Praxiteles and other Greek maſters. In the ſame room are many valuable curioſities, beſides a collection of admirable pictures by the beſt maſters. There are various other rooms, whoſe contents are indicated by the names they bear; as, the Cabinet of Arts, of Aſtronomy, of Natural Hiſtory, of Medals, of Porcelain, of Antiquities; the Saloon of the Hermaphrodite, ſo called from a ſtatue which divides the admiration of the amateurs with that in the Borgheſe village at Rome, though the excellence of the execution is diſgraced by the vileneſs of the ſubject; and the Gallery of Portraits, which contains the portraits of the moſt eminent painters (all executed by themſelves) who have flouriſhed in Europe during the three laſt centuries. Our limits will not admit of a detail of the hundredth part of the curioſities and buildings of Florence. We muſt not however omit mentioning the chapel of St Lorenzo, as being perhaps the fineſt and moſt expenſive habitation that ever was reared for the dead; it is encruſted with precious ſtones, and adorned by the workmanſhip of the beſt modern ſculptures. Mr Addiſon remarked, that this chapel advanced ſo very ſlowly, that it is not impoſſible that the family of Medicis may be extinct before their burial-place is finiſhed. This has actually taken place; the Medici family is extinct, and the chapel remains ſtill unfiniſhed.

Florence is a place of ſome ſtrength and contains an archbiſhop's ſee and an univerſity. The number of inhabitants is calculated at 80,000. They boaſt of the improvements they have made in the Italian tongue, by means of their Academia della Cruſca; and ſeveral other academies are now eſtabliſhed at Forence. Though the Florentines affect great ſtate, yet their nobility and gentry drive a retail trade in wine, which they ſell from their cellar windows, and ſometimes they even hang out a broken flaſk, as a ſign where it may be bought. They deal, beſides wine and fruits, in gold and ſilver ſtuffs. The Jews are not held in that degree of odium, or ſubjected to the ſame humiliating diſtinctions here, as in moſt other cities of Europe; and it is ſaid that ſome of the richeſt merchants are of that religion.

As to the manners and amuſements of the inhabitants, Dr Moore informs us, that "beſides the *converſazionis* which they have here as in other towns of Italy, a number of the nobility meet every day at a houſe called the *Caſino*. This ſociety is pretty much on the ſome footing with the clubs in London. The members are elected by ballot. They meet at no particular hour, but go at any time that is convenient. They play at billiards, cards, and other games, or continue converſing the whole evening, as they think proper. They are ſerved with tea, coffee, lemonade, ices, or what other refreſhments they choſe; and each perſon pays for what he calls for. There is one material difference between this and the Engliſh clubs, that women as well as men are members. The company of both ſexes behave with more frankneſs and familiarity to ſtrangers, as well as to each other, than is cuſtomary in public aſſemblies in other parts of Italy. The opera is a place where the people of quality pay and receive viſits, and converſe as freely as at the Caſino abovementioned. This occaſions a continual paſſing and repaſſing to and from the boxes, except in thoſe where there is a party of cards formed; it is then looked on as a piece of ill manners to diſturb the players. From this it may be gueſſed, that here, as in ſome other towns in Italy, little attention is paid to the muſic by the company in the boxes, except at a new opera, or during ſome favourite air. But the dancers command a general attention: as ſoon as they begin, converſation ceaſes; even the card players lay down their cards, and fix their eyes on the *ballette*. Yet the excellence of Italian dancing ſeems to conſiſt in feats of ſtrength, and a kind of jerking agility, more than in graceful movement. There is a continual conteſt among the performers who ſhall ſpring higheſt. You ſee here none of the ſprightly alluring gaiety of the French comic dancers, nor of the graceful attitudes and ſmooth flowing motions of the performers in the ſerious opera at Paris. It is ſurpriſing, that a people of ſuch taſte and ſenſibility as the Italians, ſhould prefer a parcel of athletic jumpers to elegant dancers. On the evenings on which there is no opera, it is uſual for the genteel company to drive to a public walk immediately without the city, where they remain till it begins to grow duſkiſh." E. Long. 12. 24. N. Lat. 43. 34.

FLORENCE, an ancient piece of Engliſh gold-coin. Every pound-weight of ſtandard-gold was to be coined into 50 Florences to be current at ſix ſhillings each; all which made in tale 15 pounds; or into a proportionate number of half-Florences or quarter pieces, by indenture of the mint: 18 Edw. III.

FLORENTIA (anc. geog.), a town of Etruria, on the Arnus; of great note in Sylla's wars. Now called *Florenza* or *Firenza* by the Italians; *Florence* in Engliſh. E. Long. 11. Lat 43. 30.

FLORENTINE MARBLE. See CITADANESCA.

FLORESCENTIA (from *floreſco*, "to flouriſh or bloom"): the act of flowering, which Linnæus and the ſexualiſts compare to the act of generation in animals; as the ripening of the fruit in their opinion reſembles the birth. See FLOWER.

FLORID STYLE, is that too much enriched with figures and flowers of rhetoric.

FLORIDA, the moſt ſoutherly province of the Britiſh Empire in America before the laſt war, bounded on the ſouth by the Gulph of Mexico, on the north by the Apalachian mountains, on the eaſt by the province of Georgia, and on the weſt by the river Miſſiſſippi. It was firſt diſcovered, in 1497, by Sebaſtian Cabot, a Venetian, then in the Engliſh ſervice; whence a right to the country was claimed by the kings of England; and this province as well as Georgia, were included in the charter granted by Charles II. to Carolina. In 1512, however, Florida, was more fully diſcovered by Ponce de Leon an able Spaniſh navigator, but who undertook his voyage from the moſt abſurd motives that can be well imagined. The Indians of the Caribbee iſlands had among them a tradition, that ſomewhere on the continent there was a fountain whoſe waters had the property of reſtoring youth to all old men who taſted them. The romantic imaginations of the Spaniards were delighted with this idea. Many embarked in voyages to find out this imaginary fountain, who were never afterwards heard of. Their ſuperſtitious countrymen never imagined that theſe people had periſhed. They concluded that they did not return only becauſe they had drunk of the immortalizing liquor, and had diſcovered a ſpot ſo delightful, that they did not chooſe to leave it.—Ponce de Leon ſet out with this extravagant view as well as others, and fully perſuaded of the exiſtence of a third world, the conqueſt of which was to immortalize his name. In the attempt to diſcover this country, he rediſcovered Florida; but returned to the place from whence he came viſibly more advanced in years than when he ſet out.—For ſome time this country was neglected by the Spaniards, and ſome Frenchmen ſettled in it. But the new colony being neglected by the miniſtry, and Philip II. of Spain having accuſtomed himſelf to think that he was the ſole proprietor of America, fitted out a fleet at Cadiz to deſtroy them. His orders were executed with barbarity. The French entrenchments were forced, and moſt of the people killed. The priſoners were hanged on trees; with this inſcription, "Not as Frenchmen but as Heretics."

This cruelty was ſoon after revenged by Dominic de Gourgues, a ſkilful and intrepid ſeamen of Gaſcony, an enemy to the Spaniards, and paſſionately fond of hazardous expeditions and of glory. He ſold his eſtate; built ſome ſhips; and with a ſelect band of adventurers like himſelf, embarked for Florida. He drove the Spaniards from all their poſts with incredible valour and activity : defeated them in every rencounter ; and, by way of retaliation, hung the priſoners on trees, with this inſcription, " Not as Spaniards, but as Aſſaſſins." This expedition was attended with no other conſequences ; Gourgues blew up the forts he had taken and returned home, where no notice was taken of him. It was conquered in 1539, by the Spaniards under Ferdinand de Soto, not without a great deal of bloodſhed ; as the natives were very warlike, and made a vigorous reſiſtance. The ſettlement, however, was not fully eſtabliſhed till the year 1665 ; when the town of St Auguſtine, the capital of the colony while it remained in the hands of the Spaniards, was founded. In 1586, this place was taken and pillaged by ſir Francis Drake. It met with the ſame fate in 1665, being taken and plundered by Captain Davis and a body of buccaneers. In 1702, an attempt was made upon it by Colonel More, governor, of Carolina. He ſet out with 500 Engliſh and 700 Indians ; and having reached St Auguſtine, he beſieged it for three months ; at the expiration of which, the Spaniards having ſent ſome ſhips to the relief of the place, he was obliged to retire. In 1740, another attempt was made by General Oglethorpe : but he being outwitted by the Spaniſh governor, was forced to raiſe the ſiege with loſs ; and Florida continued in the hands of the Spaniards till the year 1763, when it was ceded by treaty to Great Britain.—During the laſt war it was again reduced by his Catholic majeſty, and was gauranteed to the crown of Spain at the peace.

FLORILEGIUM, Florilege, a name the Latins have given to what the Greeks call ανθολογιον, *anthology* ; viz. a collection of choice pieces, containing the fineſt and brighteſt things in their kind.

Florilege is alſo particularly uſed for a kind of breviary, in the Eaſtern church, compiled by Arcadius, for the conveniency of the Greek prieſts and monks, who cannot carry with them, in their travels and pilgrimages, all the volumes wherein their office is diſperſed. The florilegium contains the general rubrics, pſalter, canticles, the horologium, and the office of the feriæ, &c.

FLORIN, is ſometimes uſed for a coin, and ſometimes for a money of account.

Florin, as a coin, is of different values, according to the different metals and different countries where it is ſtruck. The gold florins are moſt of them of a very coarſe alloy, ſome of them not exceeding thirteen or fourteen carats, and none of them ſeventeen and a half. See *Money-Table*.

Florin, as a money of account, is uſed by the Italian, Dutch, and German merchants and bankers, but admits of different diviſions in different places. *Ibid.*

FLORINIANI, or Floriani, a ſect of heretics, of the ſecond century, denominated from its author Florinus, or Florianus, a prieſt of the Roman church, depoſed along with Blaſtus for his errors. Florinus had been a diſciple of St Polycarp, along with Irenæus. He made God the author of evil ; or rather aſſerted, that the things forbidden by God are not evil, but of his own appointing. In which he followed the errors of Valentinus, and joined himſelf with the Carpocratians. They had alſo other names given them. Philaſtrius ſays, they were the ſame with the *Carpophorians*. He adds, they were alſo called *ſoldiers*, *milites*, *quia de militaribus fuerunt*. St Irenæus calls them *Gnoſtics* ; St Epiphanius, *Phibionites* ; and Theodoret, *Borborites*, on account of the impurities of their lives. Others call them *Zaccheans* ; others *Coddians*, &c. though for what particular reaſons, it is not eaſy to ſay, nor perhaps would it be worth while to inquire.

FLORIS (Francis), an eminent hiſtorical painter, was born at Antwerp in 1520. He followed the profeſſion of a ſtatuary till he was twenty years of age ; when preferring painting, he entered the ſchool of Lambert Lombard, whoſe manner he imitated very perfectly. He afterwards went to Italy, and completed his ſtudies from the moſt eminent maſters. The great progreſs he made in hiſtorical painting, at his return procured him much employment ; and his countrymen complimented him with the flattering appellation of *the Flemiſh Raphael*. He got much money, and might have rendered his acquaintance more worthy of the attention of the great, had he not debaſed himſelf by frequent drunkenneſs. He died 1570, aged 50.

FLORIST, a perſon curious or ſkilled in flowers ; their kinds, names, characters, culture, &c. It is alſo applied to the author who writes what is called the flora of any particular place, that is, a catalogue of the plants and trees which are found ſpontaneouſly growing there.

FLORUS (Lucius Annæus), a Latin hiſtorian, of the ſame family with Seneca and Lucan. He flouriſhed in the reigns of Trajan and Adrian ; and wrote an Abridgement of the Roman Hiſtory, of which there have been many editions. It is compoſed in a florid and poetical ſtyle ; and is rather a panegyric on many of the great actions of the Romans, than a faithful and correct recital of their hiſtory. He alſo wrote poetry, and entered the liſts againſt the emperor Adrian, who ſatirically reproached him with frequenting taverns and places of diſſipation.

FLORY, Flowry, or *Fleury*, in heraldry, a croſs that has the flowers at the end circumflex and turning down ; differing from the *potence*, inaſmuch as the latter ſtretches out more like that which is called *patee*.

FLOS, Flower, in botany. See Flower.

Fœmineus Flos, a flower which is furniſhed with the pointal or female organs of generation, but wants the ſtamina or male organ. Female flowers may be produced apart from the male, either on the ſame root or on diſtinct plants. Birch and mulberry are examples of the firſt caſe ; willow and poplar of the ſecond.

Maſculus Flos, a male flower. By this name Linnæus and the ſexualiſts diſtinguiſh a flower which contains the ſtamen, reckoned by the ſexualiſts the male organ of generation ; but not the ſtigma or female organ. All the plants of the claſs diœcia of Linæus have male and female flowers upon different roots : thoſe of the claſs monœcia bear flowers of different ſexes on the ſame root. The plants, therefore, of the former are only male and female ; thoſe of the latter are androgynous ; that is, contain a mixture of both male and female flowers.

Flos in chemiſtry, the moſt ſubtle part of bodies ſeparated from the more groſs parts by ſublimation in a dry form.

FLOTA, or Flotta, *fleet* ; a name the Spaniards give particularly to the ſhips which they ſend annually from Cadiz to the port of Vera Cruz, to fetch thence the merchandizes gathered in Mexico for Spain. It conſiſts of the captains, admiral, and patach, or pinnance, which go on the king's account; and about 16 ſhips, from 400 to 1000 tons, belonging to particular perſons. They ſet out from Cadiz about the month of Auguſt, and are 18 or 20 months before they return. Thoſe ſent to fetch the commodities prepared in Peru are called *galleons*.

The name *flotilla* is given to a number of ſhips, which get before the reſt in their return, and give information of the departure and cargo of the flota and galleons.

FLOTSON, or Flotsom, goods that by ſhipwreck are loſt, and floating upon the ſea; which, with jetſon and lagan, are generally given to the lord admiral; but this is the caſe only where the owners of ſuch goods are not known. And here it is to be obſerved, that *jetſon* ſignifies any thing that is caſt out of a ſhip when in danger, and afterwards is beat on the ſhore by the water, notwithſtanding which the ſhip periſhes. *Lagan* is where heavy goods are thrown overboard, before the wreck of the ſhip, and ſink to the bottom of the ſea.

FLOUNDER, Fluke, or *But*, in itchthyology. See Pleuronectes.

Flounders may be fiſhed for all day long, either in a ſwift ſtream, or in the ſtill deep water; but beſt in the ſtream, in the months of April, May, June, and July; the moſt proper baits are all ſorts of worms, waſps, and gentles.

FLOUR, the meal of wheat-corn, finely ground and ſifted. See Meal.

The grain itſelf is not only ſubject to be eaten by inſects in that ſtate; but, when ground into flour, it gives birth to another race of deſtroyers, who eat it unmercifully, and increaſes ſo faſt in it, that it is not long before they wholly deſtroy the ſubſtance. The fineſt flour is moſt liable to breed theſe, eſpecially when ſtale or ill prepared. In this caſe, if it be examined in a good light, it will be obſerved to be in continual motion, and on a nicer inſpection there will be found in it a great number of little animals of the colour of the flour, and very nimble. If a little of this flour is laid on the plate of the double microſcope, the inſects are very diſtinctly ſeen in great numbers, very briſk and lively, continually crawling over one anothers backs, and playing a thouſand antic tricks together; whether in diverſion, or in ſearch of food, is not eaſy to be determined. Theſe animals are of an oblong and ſlender form; their heads are furniſhed with a kind of trunk or hollow tube, by means of which they take in their food, and their body is compoſed of ſeveral rings. They do vaſt miſchief among magazines of flour laid up for armies and other public uſes. When they have once taken poſſeſſion of a parcel of this valuable commodity, it is impoſſible to drive them out; and they increaſe ſo faſt, that the only method of preventing the total loſs of the parcel is to make it up into bread as ſoon as can be done. The way to prevent their breeding in the flour is to preſerve it from damp: nothing gets more injury by being put in damp than flour; and yet nothing is more frequently put up ſo. It ſhould be always carefully and thoroughly dried before it is put up; and the barrels alſo dried in which it is to be put; then, if they are placed in a room tolerably warm and dry, they will keep it well. Too dry a place never does flour any hurt, though one too moiſt almoſt always ſpoils it.

Flour when carefully analyſed, is found to be compoſed of three very different ſubſtance. The firſt and moſt abundant is pure *ſtarch*, or white fecule, inſoluble in cold but ſoluble in hot water, and of the nature of mucous ſubſtances; which when diſſolved, form water-glues. The ſecond is the *gluten*, moſt of whoſe properties have been deſcribed under the article Bread. The third is of a mild nature, perfectly ſoluble in cold water, of the nature of *ſaccharine* extractive mucous matters. It is ſuſceptible of the ſpirituous fermentation, and is found but in ſmall quantity in the flower of wheat. See Bread, Gluten, Starch, and Sugar.

FLOWER Flos, among botaniſts and gardeners, the moſt beautiful parts of trees and plants, containing the organs or parts of fructification. See Botany, p. 427—429, and explanation of Plate CIII. in p. 439, col. 1. See alſo p. 441, col. 1.

Flowers deſigned for medicinal uſe, ſhould be plucked when they are moderately blown, and on a clear day before noon; for conſerves, roſes muſt be taken in the bud.

Flowers, in antiquity. We find flowers in great requeſt at the entertainment of the ancients, being provided by the maſter of the feaſt, and brought in before the ſecond courſe; or as ſome are of opinion, at the beginning of the entertainment. They not only adorned their heads, necks, and breaſts, with flowers, but often beſtrewed the beds whereon they lay, and all parts of the room with them. But the head was chiefly regarded. See Garland.

Flowers were likewiſe uſed in the bedecking of tombs. See Burial.

Eternal Folwer. See Xeranthemum.

Everlaſting Flower. See Gnaphalium.

Flower-Fence. See Poinciana.

Sun-Flower. See Helianthus.

Sultan-Flower. See Cyanus.

Trumpet-Flower. See Bignonia.

Wind-Flower. See Anemone.

Flower-de-lis, or *Flower-de-luce*, in heraldry, a bearing repreſenting the lily, called the *queen of flowers*, and the true hieroglyphic of royal majeſty; but of late it is become more common, being borne in ſome coats one, in others three, in others five, and in ſome *ſemee* or ſpread all over the eſcutcheon in great numbers.

The arms of France are, three flower-de-lis or, in a field azure.

Flower de Luce. See Iris.

Flowers, in heraldry. They are much uſed in coats of arms: and in general ſignify hope, or denote human frailty and momentary proſperity.

Flowers, in chemiſtry. By this name are generally underſtood bodies reduced into very fine parts, either ſpontaneouſly, or by ſome operation of art; but the term is chiefly applied to volatile ſolid ſubſtances, reduced into very fine parts, or into a kind of meal by ſublimation.—Some flowers are nothing elſe than the bodies themſelves, which are ſublimed entire, without ſuffering any alteration or decompoſition; and other flowers are ſome of the conſtituent parts of the body ſubjected to ſublimation.

Colours of Flowers. See the article Colour (*of Plants*).

Colours extracted from Flowers. See *Colour-Making*, n° 35, 40.

Preſerving of Flowers. The method of preſerving flowers in their natural beauty through the whole year has been much ſought after by many people. Some have attempted it by gathering them when dry and not too much opened, and burying them in dry ſand; but this, though it preſerves their figure well, takes off from the livelineſs of their colour. Muntingius prefers the following method to all others. Gather roſes, or other flowers when they are not yet thoroughly open, in the middle of a dry day: put them into a good earthen veſſel glazed within; fill the veſſel up to the top with them; and when full ſprinkle them over with ſome good French wine, with a little ſalt in it; then ſet them by in a cellar, tying down the mouth of the pot. After this they may be taken out at pleaſure; and, on ſetting them in the ſun, or within reach of the fire, they will open as if growing naturally; and not only the colour, but the ſmell alſo will be preſerved.

The flowers of plants are by much the moſt difficult parts of them to preſerve in any tolerable degree of perfection; of which we have inſtances in all the collections of dried plants, or *horti ſicci*. In theſe the leaves, ſtalks, roots, and ſeeds of the plants appear very well preſerved; the ſtrong texture of theſe parts making them always retain their natural form, and the colours in many ſpecies naturally remaining. But where theſe fade, the plant is little the worſe for uſe as to the knowing the ſpecies by it. But it is very much otherwiſe in regard to flowers: theſe are naturally by much the moſt beautiful parts of the plants to which they belong; but they are ſo much injured in the common way of drying, that they not only loſe, but change their colours one into another, by which means they give a handle to many errors; and they uſually alſo wither up, ſo as to loſe their very form and natural ſhape. The primroſe and cowſlip kinds are very eminent inſtances of the change of colours in the flowers of dried ſpecimens: for thoſe of this claſs of plants eaſily dry in their natural ſhape; but they loſe their yellow, and, inſtead of it, acquire a fine green colour, much ſuperior to that of the leaves in their moſt perfect ſtate. The flowers of all the violet kind loſe their beautiful blue, and become of a dead white: ſo that in dried ſpecimens there is no difference between the blue-flowered violet and the white-flowered kinds.

Sir Robert Southwell has communicated to the world a method of drying plants, by which this defect is propoſed to be in a great meaſure remedied, and all flowers preſerved in their natural ſhape, and many in their natural colours. For this purpoſe two plates of iron are to be prepared of the ſize of a large half-ſheet of paper, or larger, for particular occaſions: theſe plates muſt be made ſo thick as not to be apt to bend; and there muſt be a hole made near every corner for the receiving a ſcrew to faſten them cloſe together. When theſe plates are prepared, lay in readineſs ſeveral ſheets of paper, and then gather the plants with their flowers when they are quite perfect. Let this be always done in the middle of a dry day; and then lay the plant and its flower on one of the ſheets of paper doubled in half, ſpreading out all the leaves and petals as nicely as poſſible. If the ſtalk is thick, it muſt be pared or cut in half ſo that it may lie flat; and if it is woody, it may be peeled, and only the bark left. When the plant is thus expanded, lay round about it ſome looſe leaves and petals of the flower, which may ſerve to complete any part that is deficient. When all is thus prepared, lay ſeveral ſheets of paper over the plant, and as many under it; then put the whole between the iron plates, laying the papers ſmoothly on one, and laying the other evenly over them: ſcrew them cloſe, and put them into an oven after the bread is drawn, and let them lie there two hours. After that, make a mixture of equal parts of aquafortis and common brandy; ſhake theſe well together, and when the flowers are taken out of the preſſure of the plates, rub them lightly over with a camel's-hair pencil dipped in this liquor; then lay them upon freſh brown paper, and covering them with ſome other ſheets, preſs them between this and other papers with a handkerchief till the wet of theſe liquors is dried wholly away. When the plant is thus far prepared, take the bulk of a nutmeg of gum-dragon; put this into a pint of fair water cold, and let it ſtand 24 hours; it will in this time be wholly diſſolved: then dip a fine hair-pencil in this liquor, and with it daub over the backſides of the leaves, and lay them carefully down on half a ſheet of white paper fairly expanded, and preſs them down with ſome more papers over theſe. When the gum-water is fixed, let the preſſure and papers be removed, and the whole work is finiſhed. The leaves retain their verdure in this caſe, and the flowers uſually keep their natural colours. Some care, however, muſt be taken, that the heat of the oven be not too great. When the flowers are thick and bulky, ſome art may be uſed to pare off their backs, and diſpoſe the petals in a due order; and after this, if any of them are wanting, their places may be ſupplied with ſome of the ſupernumerary ones dried on purpoſe; and if any of them are only faded, it will be prudent to take them away, and lay down others in their ſtead: the leaves may be alſo diſpoſed and mended in the ſame manner.

Another method of preſerving both flowers and fruit ſound throughout the whole year is alſo given by the ſame author. Take ſaltpetre one pound; armenian bole, two pounds; clean common ſand, three pounds. Mix all well together; than gather fruit of any kind that is not fully ripe, with the ſtalk to each; put theſe in, one by one, into a wide-mouthed glaſs, laying them in good order. Tie over the top with an oil-cloth, and carry them into a dry cellar, and ſet the whole upon a bed of the prepared matter of four inches thick in a box. Fill up the remainder of the box with the ſame preparation; and let it be four inches thick all over the top of the glaſs, and all around its ſides. Flowers are to be preſerved in the ſame ſorts of glaſſes, and in the ſame manner; and they may be taken up after a whole year as plump and fair as when they were buried.

Flowers (artificial) of the Chineſe. See Tong-tsao.

FLOWERS, in chemiſtry, are the fineſt and moſt ſubtle parts of dry bodies, raiſed by fire, into the veſſel's head and aludels; and adhering to them in form of a fine powder or duſt. Such are the flowers of ſulphur, benjamin, &c.

FLOWERS, in the animal economy, denote womens monthly purgations or menſes.—Nicod derives the word in this ſenſe from *fluere*, q. d. *fluors*. Others will have the name occaſioned hence, that women do not conceive till they have had their flowers; ſo that theſe are a ſort of forerunners of their fruits.

FLOWERS, in rhetoric, are figures or ornaments of diſcourſe, by the Latins called *floſculi*.

FLOWERING *of Bulbous Plants*. Theſe plants will grow and flower in water alone, without any earth, and make a very elegant appearance. We daily ſee this practiſed in ſingle roots; but there is a method of doing it with ſeveral roots in the ſame veſſel. Take a common ſmall garden-pot; ſtop the hole at the bottom with a cork, and lute in the cork with putty, that no water can get through; then fit a board to the top of the pot, and bore ſix or ſeven holes in it at equal diſtances, to place the bulbs in; and as many ſmaller ones near them to receive ſticks, which will ſerve to tie up the flowers. Then fill up the pot with water to the board; and place tulips, jonquils, narciſſus's, and the like plants in the root upon the holes, ſo that the bottom of the roots may touch the water: thus will they all flower early in the ſeaſon, and be much more beautiful than any pot of gathered flowers, and will laſt many weeks in their full perfection. After the ſeaſon of flowering is over, the roots will gradually ſhrink thro' the holes of the board, and get looſe into the water: but, inſtead of being ſpoiled there, they will ſoon increaſe in ſize; ſo that they cannot return through the holes, and will produce ſeveral off-ſets. It is natural to try from this the conſequence of keeping the roots under water during the whole time of their blowing; and in this way they have been found to ſucceed very well, and flower even ſtronger and more beautifully than when in the ground. They may thus, alſo, with proper care in the degree of heat in the room, be kept flowering from before Chriſtmas till March and April. It is not eaſy, in this laſt manner, to manage the keeping the boards under water, for which reaſon, it is better to procure ſome ſheet-lead of about four pounds to the foot, and cut this to the ſize of the mouth of the pot. In this there ſhould be bored holes for the bulbs, and other holes for the ſticks: and, in order to keep the ſticks quite firm, it is proper to have another plate of lead ſhaped to the bottom of the pot, with holes in it, anſwering to thoſe of the upper plate made for the ſticks. The ſticks will by this means be always kept perfectly ſteady; and the roots, being kept under water by the upper plate of lead, will flower in the moſt vigorous and beautiful manner imaginable.

Some have thought of adding to the virtues of the water by putting in nitre in ſmall quantities, and others have added earth and ſand at the bottom; but it has always been found to ſucceed better without any addition.

It may be more agreeable to ſome to uſe glaſs jars in this laſt method with the leads, inſtead of earthen pots. The bulbs ſucceed full as well as theſe; and there is this advantage, that the progreſs of the roots is ſeen all the while, and they are managed better as to the ſupply of water.

By repeated experiments in this way on dried bulbs, and on thoſe taken freſh out of the ground, the former have been found to ſucceed the beſt. For thoſe taken freſh out of the ground being full of moiſture, will not ſo ſoon, upon changing their element, be nouriſhed fully by a new one; and the fibres which they had ſtruck in the ground, always rot when put into the water, and new ones muſt be formed in their places; ſo that it requires more time for them to come to flowering. The bulbs themſelves will not rot in this manner; but they will never be ſo ſtrong as thoſe which were put into the water dry, which gradually fill themſelves with moiſture from it, and regularly plump up. The beſt method of managing the whole proceſs is this: Place the bulbs at firſt only on the ſurface of the water; for thus they will ſtrike out their fibres moſt ſtrongly. When they have ſtood thus ſix weeks, pour in the water ſo high as to cover them entirely, and keep them thus till they have done flowering.

Sometimes the roots will become mouldy in ſeveral parts while they ſtand above the water, and the clearing them of it is to no purpoſe; for it will eat and ſpread the farther, and frequently eat through two or three of their coats. In this caſe they muſt be immediately covered with water; when the mould will be ſtopped, and the roots become ſound, and flower as well as thoſe which never had any ſuch diſtemper. If the roots are ſuffered to remain in water all the year, they will not decay; but will flower again at their proper ſeaſon, and that as vigorouſly as thoſe which have been taken out and dried. The old fibres of thoſe roots never rot till they are ready to puſh forth new ones. It is found by experience that the hyacinth, and many other plants, grow to a greater degree of perfection when thus in water than when in the ground. There is a peculiar ſpecies of hyacinth called *Keyſer's jewel*; this never, or very rarely, produces ſeed-veſſels in the common way of flowering in the ground; but it will often produce ſome pods when blown in water.

Mr Millar has intimated, in the Philoſophical Tranſactions, that bulbs ſet in glaſſes grow weaker, and ſhould be renewed every other year: but it is found that, when managed in this manner, and kept under water, at the time of taking them up, they are as large, and ſome of them larger, than when planted; and if theſe be dried at a proper ſeaſon, they will flower, year after year, as well as freſh ones.

Ranunculus and anemone roots have been found to ſhoot up their ſtalks very well in this way; but the flowers are uſually blaſted, which ſeems to ariſe from want of free air. Pinks will flower very well in this manner; auriculas alſo may, with care, be brought to flower, but not ſtrongly. Roſes, jeſſamines, and honeyſuckles, may alſo be made to flower this way, and will thrive and ſend out ſuckers; the beſt pieces to plant, are ſuckers cut off about three inches under ground, without any fibres. The ſucculent plants may alſo be raiſed this way; for inſtance, the opuntia or Indian fig. If a fragment of a leaf of this plant be cut, and laid by to dry for a month till it is an abſolute ſkin, as ſoon as it is put in this manner into water, it begins to plump up, and ſoon ſends out fibrous roots, and produces new leaves as quickly as it would do in the ground.

This the more ſingular in theſe ſort of plants, becauſe in their natural ſtate in the ground, they cannot bear much water. This method of growing in water is not peculiar to the bulbous-rooted ones, but others may even be raiſed from ſeed by it. A bean or pea, ſet in this manner, will grow up to its proper ſtandard, and will flower and produce pods which will ripen their ſeed. The ſmaller ſeeds may be alſo raiſed in this manner, by the help of wool to ſupport them.

No vegetable tranſplanted out of the earth into water will thrive kindly; but any plant, whether raiſed from the root or ſeed in water, may be tranſplanted to the earth, and will ſucceed very well. It may be poſſible, therefore, from this method of raiſing plants in water, to come at a better way than is uſually practiſed of raiſing ſome roots in the earth which are ſubject to rot there; ſuch as anemonies, ranunculuſes, and hyacinths. A bulb dropped by chance upon the ground, will ſtrike out both ſtronger and more numerous fibres than thoſe which are planted in the uſual way in the ground. On this principle, it may be proper to take out the earth of the bed where the bulbs are to ſtand at the time of planting them, to ſuch a depth as they are to be placed under it when ſet for flowering. The bulbs are then to be ſet in their places, on the ſurface of this low ground; and to ſtand there till they have ſhot out their fibres and their head: then the earth is to be added over them by degrees, till they are covered as high above the head as they are in the uſual manner of planting them: thus they would be preſerved from the danger of rotting; and their fibres would be much ſtronger, and conſequently they would draw more nouriſhment, and flower better, than in the common way. The common method of planting theſe roots renders them liable to be deſtroyed by either extreme of a wet or a dry ſeaſon. In the firſt caſe, they immediately rot by the abundant moiſture they receive; and, in the ſecond, they become dry as a ſtick, and mouldy; ſo that they are infallibly rotted by the firſt rain that falls afterwards.

The directions neceſſary to the ſucceſs of the bulbs planted in water are theſe. When the leaden falſe bottoms are fixed down tight within two or three inches of the bottom of the veſſel (which is only deſigned to hold the ſticks ſteady which are to ſupport the leaves and ſtalks), then lay on the lead upon which the bulbs are to reſt, placing the notched part oppoſite to that in the falſe bottom, as near as the ſticks, when placed, will ſuffer it; then place the bulbs one in each hole, and fill up with water to the upper lead. The bottom of the bulb will then touch the water; and as the water diminiſhes in quantity, keep it ſupplied with more up to the ſame height for a month or ſix weeks; in which time the bulbs will have ſhort ſtrong fibres. Then fill up the water about half an inch above the ſurface of the lead; and, by degrees, as the fibres ſtrengthen, and the plume ſhoots from the head, keep the water higher and higher, till at length the whole bulb is covered. The water is to be kept at this ſtandard till the ſeaſon for drying them returns.—At the time of planting the bulbs, they muſt be carefully cleaned from any foulneſſes at the bottom, by ſcraping them with the point of a knife till the ſound part of the bulb appears; clear them likewiſe from any looſe ſkins, and even take off their brown ſkin till they appear white; otherwiſe this brown ſkin will tinge the water, and the growth will not ſucceed ſo well.

The notches in the ſide of each lead are intended to give eaſy paſſage to the water, that, if there ſhould be any foulneſs or ſediment in it, on ſhaking it a little it may all run through, and freſh water be put in its place. But this ſhifting the water need not be done more than once or twice in a winter, as there may be occaſion from the foulneſs; and when this is done, the ſides of the veſſel ſhould be cleaned with a painter's bruſh, and rinſed out again, and the bulbs themſelves waſhed, by pouring water on them at a little diſtance.

At any time when the outer ſkins of the bulbs dry, they are to be peeled off, that they may not occaſion foulneſs in the water; and if any duſt or foul matter be at any time obſerved ſwimming on the ſurface, the method is to fill up the pot or veſſel to the rim, and let it run over: this will carry off that light foulneſs, and the water may afterwards be poured away to the proper ſtandard.

Bulbs of equal bigneſs ſhould be planted together in the ſame pot, that they may all have the ſame benefit of the water. Narciſſuſes and hyacinths do well together; as alſo tulips and jonquils, and crocuſes and ſnow-drops.

FLUDD (Robert), a famous philoſopher, born in 1574. He was fellow of the college of phyſicians in London, and became a moſt voluminous writer: he doated greatly on the wonders of chemiſtry; was a zealous brother of the Roſicruſian order; and his books which are moſtly in Latin, are as dark and myſterious in their language as in their matter. He died in 1637.

FLUID, an appellation given to all bodies whoſe particles eaſily yield to the leaſt partial preſſure, or force impreſſed. For the

Laws and properties of FLUIDS. See HYDROSTATICS.

There are various kinds of animalcules to be diſcerned in different fluids by the microſcope. Of many remarkable kinds of theſe, a deſcription is given under the article ANIMALCULE. All of theſe little creatures are eaſily deſtroyed by ſeparating them from their natural element. Naturaliſts have even fallen upon ſhorter methods. A needle-point, dipped in ſpirit of vitriol, and then immerſed into a drop of pepper-water, readily kills all the animalcules; which, though before friſking about with great livelineſs and activity, no ſooner come within the influence of the acid particles, than they ſpread themſelves, and tumble down to all appearance dead. The like may be done by a ſolution of ſalt; only with this difference, that, by the latter application, they ſeem to grow vertiginous, turning round and round till they fall down. Tincture of ſalt of tartar, uſed in the ſame manner, kills them ſtill more readily; yet not ſo, but there will be apparent marks of their being firſt ſick and convulſed. Inks deſtroy them as faſt as ſpirit of vitriol, and human blood produces the ſame effect. Urine, ſack, and ſugar, all deſtroy them, though not ſo faſt; beſides, that there is ſome diverſity in their figures and appearances, as they receive their deaths from this poiſon or that. The point of a pin dipped in ſpittle, preſently killed all the kinds of animalcules in puddle-water, as Mr. Harris ſuppoſes it will other animalcules of this kind.

All who are acquainted with microſcopic obſervations, know very well, that in winter, in which the beſt glaſſes can diſcover no particle of animated matter, after a few grains of pepper, or a fragment of a plant of almoſt any kind, has been ſome time in it, animals full of life and motion are produced; and thoſe in ſuch numbers, as to equal the fluid itſelf in quantity.—When we ſee a numerous brood of young fiſhes in a pond, we make no doubt of their having owed their origin to the ſpawn, that is, to the eggs of the parents of the ſame ſpecies. What are we then to think of theſe? If we will conſider the progreſs of nature in the inſect tribes in general, and eſpecially in ſuch of them as are moſt analogous to theſe, we ſhall find it leſs difficult to give an account of their origin than might have been imagined.

A ſmall quantity of water taken from any ditch in the ſummer months, is found to be full of little worms, ſeeming in nothing ſo much as in ſize to differ from the microſcopic animalcules. Nay, water, without theſe, expoſed in open veſſels to the heat of the weather, will be always found to abound with multitudes of them, viſible to the naked eye, and full of life and motion. Theſe we know, by their future changes, are the fly-worms of the different ſpecies of gnats, and multitudes of other fly-ſpecies; and we can eaſily determine, that they have owed their origin only to the eggs of the parent-fly there depoſited. Nay, a cloſer obſervation will at any time give ocular proof of this; as the flies may be ſeen laying their eggs there, and the eggs may be followed through all their changes to the fly again. Why then are we to doubt that the air abounds with other flies and animalcules as minute as the worms in thoſe fluids; and that theſe laſt are only the fly-worms of the former, which after a proper time ſpent in that ſtate, will ſuffer changes like thoſe of the larger kinds, and become flies like thoſe to whoſe eggs they owed their origin? *Vid. Reaumur. Hiſt. Inſect.* vol. iv. p. 431.

The differently medicated liquors made by infuſions of different plants, afford a proper matter for the worms of different ſpecies of theſe ſmall flies: and there is no reaſon to doubt, but that among theſe ſome are, viviparous, others oviparous; and to this may be, in a great meaſure, owing the different time taken up for the production of theſe inſects in different fluids. Thoſe which are a proper matter for the worms of the viviparous fly, may be ſooneſt found full of them; as probably, the liquor is no ſooner in a ſtate to afford them proper nouriſhment, than their parents place them there: whereas thoſe produced from the eggs of the little oviparous flies, muſt, after the liquor is in a proper ſtate, and they are depoſited in it in the form of eggs, have a proper time to be hatched, before they can appear alive.

It is eaſy to prove, that the animals we find in theſe vegetable infuſions were brought thither from elſewhere. It is not leſs eaſy to prove, that they could not be in the matter infuſed any more than in the water in which it is infuſed.

Notwithſtanding the fabulous accounts of ſalamanders, it is now well known, that no animal, large or ſmall, can bear the force of fire for any conſiderable time; and, by parity of reaſon, we are not to believe, that any inſect, or embryo inſect, in any ſtate, can bear the heat of boiling water for many minutes. To proceed to enquiries on this foundation: If ſeveral tubes filled with water, with a ſmall quantity of vegetable matter, ſuch as pepper, oak-bark, truffles, &c. in which, after a time, inſects will be diſcovered by the microſcope; and other like tubes be filled with ſimple water boiled, with water and pepper boiled together, and with water with the two other ingredients, all ſeparately boiled in it; when all theſe liquors come to a proper time for the obſervation of the microſcope, all, as well thoſe which have been boiled as thoſe which have not, will be found equally to abound with inſects; and thoſe of the ſame kind, in infuſions of the ſame kind, whether boiled or not boiled. Thoſe in the infuſions which had ſuſtained a heat capable of deſtroying animal life, muſt therefore not have ſubſiſted either in the water or in the matters put into it, but muſt have been brought thither after the boiling; and it ſeems by no way ſo probably, as by means of ſome little winged inhabitants of the air depoſiting their eggs or worms in theſe fluids.

On this it is natural to aſk, how it comes to paſs, that while we ſee myriads of the progeny of theſe winged inſects in water, we never ſee themſelves? The anſwer is equally eaſy, viz. becauſe we can always place a drop of this water immediately before the focus of the microſcope, and keep it there while we are at leiſure to examine its contents; but that is not the caſe with regard to the air inhabited by the parent flies of theſe worms, which is an immenſe extent in proportion to the water proper for nouriſhing theſe worms; and conſequently, while the latter are cluſtered together in heaps, the former may be diſperſed and ſcattered. Nor do we want inſtances of this, even in inſects of a larger kind. In many of our gardens, we frequently find veſſels of water filled with worms of the gnat kind, as plentifully, in proportion to their ſize, as thoſe of other fluids are with animalcules. Every cubic inch of water in theſe veſſels contains many hundreds of animals; yet we ſee many cubic inches of air in the garden not affording one of the parent flies.

But neither are we poſitively to declare that the parent flies of theſe animalcules are in all ſtates wholly inviſible to us; if not ſingly to be ſeen, there are ſome ſtrong reaſons to imagine that they may in great cluſters. Every one has ſeen in a clear day, when looking ſtedfaſtly at the ſky, that the air is in many places diſturbed by motions and convolutions in certain ſpots. Theſe cannot be the effects of imagination, or of faults in our eyes, becauſe they appear the ſame to all; and if we conſider what would be the caſe to an eye formed in ſuch a manner as to ſee nothing ſmaller than an ox, on viewing the air on a marſh fully peopled with gnats, we muſt be ſenſible, that the clouds of theſe inſects, though to us diſtinctly enough viſible, would appear to ſuch an eye merely as the moving parcels of air in the former inſtance do to us: and ſurely it is thence no raſh concluſion to infer, that the caſe may be the ſame, and that myriads of flying inſects, too ſmall to be ſingly the objects of our view, yet are to us what the clouds of gnats would be in the former caſe.

Nervous FLUID. See ANATOMY, p. 761. col. 2.

Elaſtic FLUIDS. See AEROLOGY, AIR, *FIXED Air*, GAS, VAPOUR, &c.

FLUIDITY, is by Sir Iſaac Newton defined to be, that property of bodies by which they yield to any force impreſſed, and which have their parts very eaſily moved among one another.

To this definition ſome have added, that the parts of a fluid are in a continual motion. This opinion is ſupported by the ſolution of ſalts, and the formation of tinctures. If a ſmall bit of ſaffron is thrown into a phial full of water, a yellow tincture will ſoon be communicated to the water to a conſiderable height, though the phial is allowed to remain at reſt; which indicates a motion in thoſe parts of the fluid which touch the ſaffron, by which its colouring matter is carried up.

With regard to water, this can ſcarce be denied; the conſtant exhalations from its ſurface ſhow, that there muſt be a perpetual motion in its parts from the aſcent of the ſteam through it. In mercury, where inſenſible evaporation does not take place, it might be doubted; and accordingly the Newtonian philoſophers in general have been of opinion, that there are ſome ſubſtances eſſentially fluid, from the ſpherical figure of their conſtituent particles. The congelation of mercury, however, by an extreme degree of cold *, demonſtrates that fluidity is not eſſentially inherent in mercury more than in other bodies.

*See *Congelation.*

That fluids have vacuities in their ſubſtance is evident, becauſe they may be made to diſſolve certain bodies without ſenſibly increaſing their bulk. For example, water will diſſolve a certain quantity of ſalt; after which it will receive a little ſugar, and after that a little allum, without increaſing its firſt dimenſions. Here we can ſcarce ſuppoſe any thing elſe than that the ſaline particles were interpoſed between thoſe of the fluid; and, as by the mixture of ſalt and water, a conſiderable degree of cold is produced, we may thence eaſily ſee why the fluid receives theſe ſubſtances without any increaſe of bulk. All ſubſtances are expanded by heat, and reduced into leſs dimenſions by cold; therefore, if any ſubſtance is added to a fluid, which tends to make it cold, the expanſion by the bulk of the ſubſtance added, will not be ſo much perceived as if this effect had not happened; and if the quantity added be ſmall, the fluid will contract as much, perhaps more, from the cold produced by the mixture, than it will be expanded from the bulk of the ſalt. This alſo may let us know with what theſe interſtices between the particles of the fluid were filled up; namely, the element of fire or heat. The ſaline particles, upon their ſolution in the fluid, have occupied theſe ſpaces; and now the liquor, being deprived of a quantity of this element equal in bulk to the ſalt added, feels ſenſibly colder.

As, therefore, there is ſcarce any body to be found, but what may become ſolid by a ſufficient degree of cold, and none but what a certain degree of heat will render fluid; the opinion naturally ariſes, that fire is the cauſe of fluidity in all bodies, and that this element is the only eſſentially fluid ſubſtance in nature. Hence we may conclude, that thoſe ſubſtances which we call *fluids* are not eſſentially ſo, but only aſſume that appearance in conſequence of an intimate union with the element of fire; juſt as gums aſſume a fluid appearance on being diſſolved in ſpirit of wine, or ſalts in water.

Upon theſe principles Dr Black mentions fluidity as an effect of heat*. The different degrees of heat which are required to bring different bodies into a ſtate of fluidity, he ſuppoſes to depend on ſome particulars in the mixture and compoſition of the bodies themſelves: which becomes extremely probable, from conſidering that we change the natural ſtate of bodies in this reſpect, by certain mixtures; thus, if two metals are compounded, the mixture is uſually more fuſible than either of them ſeparately. See CHEMISTRY, nº 542.

* See *Chemiſtry*, nº 115, 117 119.

It is certain, however, that water becomes warmer by being converted into ice †; which may ſeem contradictory to this opinion. To this, however, the Doctor replies, that fluidity does not conſiſt in the degree of ſenſible heat contained in bodies, which will affect the hand or a thermometer; but in a certain quantity which remains in a latent ſtate ‡. This opinion he ſupports from the great length of time required to melt ice; and to aſcertain the degree of heat requiſite to keep water in a fluid ſtate, he put five ounces of water into a Florence flaſk, and converted it into ice by means of a freezing mixture put round the flaſk. Into another flaſk of the ſame kind he put an equal quantity of water cooled down nearly to the freezing point, by mixing it with ſnow, and then pouring it off. In this he placed a very delicate thermometer; and found that it acquired heat from the air of the room in which it was placed: ſeven degrees of heat were gained the firſt half hour. The ice being expoſed to the ſome degree of heat, namely, the air of a large room without fire, it cannot be doubted that it received heat from the air as faſt as the water which was not frozen: but, to prevent all poſſibility of deception, he put his hand under the flaſk containing the ice, and found a ſtream of cold air very ſenſibly deſcending from it, even at a conſiderable diſtance from the flaſk; which undeniably proved, that the ice was all that time abſorbing heat from the air. Nevertheleſs, it was not till 11 hours that the ice was half-melted, though in that time it had abſorbed ſo much heat as ought to have raiſed the thermometer to 140°; and even after it was melted, the temperature of the water was found ſcarce above the freezing point: ſo that, as the heat which entered could not be found in the melted ice, he concluded that it remained concealed in the water, as an eſſential ingredient of its compoſition. See CONGELATION.

†See *Congelation.*

‡ See *Evaporation.*

FLUKE, or FLOUNDER, in ichthyology. See PLEURONECTES.

FLUKE-Worm. See FASCIOLA.

FLUKE of an Anchor, that part of it which faſtens in the ground. See ANCHOR.

FLUMMERY, a wholeſome ſort of jelly made of oat-meal.

The manner of preparing it is as follows. Put three large handfuls of finely ground oat-meal to ſteep, for 24 hours, in two quarts of fair water: then pour off the clear water, and put two quarts of freſh water to it: ſtrain it through a fine hair-ſieve, putting in two ſpoonfuls of orange-flower water and a ſpoonful of ſugar: boil it till it is as thick as a haſty-pudding, ſtirring it continually while it is boiling, that it may be very ſmooth.

FLUOR, in phyſics, a fluid; or, more properly, the ſtate of a body that was before hard or ſolid, but is now reduced by fuſion or fire into a ſtate of fluidity.

FLOUR *Acid.* See CHEMISTRY-*Index*

FLOUR *Albus.* See MEDICINE-*Index.*

FLOUR-*Spar,* or *Blue-John,* called alſo fluxing ſpars, vitreſcent or glaſs ſpars, are a genus of foſſils compoſed of calcareous earth united with an acid of a peculiar kind, of which an account is given under CHEMISTRY; ſee that article, per Index at *Fluor acid.*

They are little harder than common calcareous ſpars, and do not ſtrike fire with ſteel; nor do they efferveſce with acids either before or after calcination. When expoſed to a ſtrong fire, they crack and ſplit in pieces, but do not melt without a violent heat. Engenſtroom informs us, that all of them which he tried melted pretty eaſily before the blow-pipe; but he was obliged to take great care to prevent them from flying away before they were thoroughly heated. Their ſpecific gravity is from 3144 to 3175. Notwithſtanding the difficulty with which they are fuſed by themſelves however, they melt very readily in conjection with other earths; running into a corroſive glaſs which diſſolves the ſtrongeſt crucibles, unleſs ſome quartz or fire-clay be mixed in their compoſition. When gradually heated, they give a phoſphoreſcent light; but loſe this property when made red-hot. Thoſe which are coloured, particularly the green ones, give the ſtrongeſt light. They melt eaſily with borax, and next to that with the microcoſmic ſalt, neither of them making any efferveſcence. They diſſolve in acids when boiling, particularly aqua-regia; and the ſolutions are precipitated by an alkali even though cold, but not ſo completely. M. Magellan informs us, that he has frequently diſſolved them in boiling vitriolic acid in order to get that of fluor in an aerial ſtate. There are three ſpecies.

1. The indurated fluor is ſolid, and of an indeterminate figure, of a dull texture, ſemitranſparent, and full of cracks in the rock. It is of a white colour.

2. Sparry fluor. This has nearly the figure of ſpar; though, on cloſe obſervation, it is found leſs regular; nothing but its gloſſy ſurface giving it the reſemblance of ſpar. It is found of various colours, viz. white, blue, green, pale-green, violet, and yellow.

3. The cryſtallized fluor is of four kinds. 1. Having an irregular figure, of a white, blue, or red colour. 2. Cryſtallized in cubes, of a yellow or violet colour. 3. Of a polygonal ſpherical figure, white or blue coloured. 4. Of an octoedral figure, clear and colourleſs.

The principal uſe of fluors is for ſmelting ores, where they act as very powerful fluxes, and on this account are much valued. They are found in various countries, particularly Sweden, and ſome other northern countries of Europe. From this quaility of melting eaſily in combination with other earthy matters, they have got the name of *fluors.* "The reſemblance between the coloured fluors and the compoſitions made of coloured glaſs (ſays Cronſtedt), has perhaps contributed not only to the fluors being reckoned of the ſame value with the coloured quartz cryſtals, by ſuch collectors as only mind colour and figure, but to their alſo obtaining a rank among the precious ſtones in the apothecaries and druggiſts ſhops." M. Fabroni obſerves, that this combination of calcareous earth with the ſparry acid is almoſt always tranſparent: it often cryſtallizes in regular cubes, ſometimes ſingle from one line to two inches in diameter, and ſometimes of an indeterminate figure. They are ſometimes of a blue colour; others are purple like amethyſts; ſome are of a brown colour, others opaque. M. Magellan ſays, that fluors in general have this ſingular property, that on being melted by the flame of the blow-pipe, together with gypſum, the lead reſulting from both is all formed with facets on the outſide; but if melted with terra ponderoſa, its ſurface is quite round or ſpherical.

M. Margraaf has made experiments in order to diſcover the nature of theſe ſtones. He aſcertained the abovementioned diſtinctions between them and the gypſeous ſpars; and therefore infers, that they are not compounded of vitriolic acid with calcareous earth. He obſerved ſingular appearances on mixing them with vitriolic and other acids, and ſubjecting the mixtures to diſtillation.

Eight ounces of the powder of a green fluor being mixed with an equal weight of pure oil of vitriol, and diſtilled together with a graduated heat, yielded, after the watery part of the acid had paſſed, a fine white ſublimate, which aroſe and adhered to the neck of the retort, and even paſſed into the receiver. The firſt parts of this ſublimate which aroſe appeared like butter of antimony; and, like this butter, they melted by the heat of a live coal brought near the neck of the retort: but the parts which aroſe towards the end of the operation, with the greateſt degree of heat, could not be melted by that heat. The retort being broken, a reſiduum was found weighing 12 oz. Hence 4 oz. of oil of vitriol remained united with the ſpar. The bottom of the retort was obſerved to be pierced with holes. Laſtly, the liquor which had paſſed into the receiver and the white ſublimate, had very ſenſibly a ſulphureous ſmell. The ſublimate, triturated a long time in a mortar with hot diſtilled water, diſſolved, and paſſed thro' a filter. To the filtrated liquor ſome fixed alkali being added, a precipitate was formed; which being well waſhed and dried, was readily melted by fire into a maſs reſembling porcelain. The ſame excellent and accurate chemiſt produced the ſame effects upon this ſtone, by ſubſtituting, inſtead of the vitriolic acid, the nitrous, marine, phoſphoric, or the concentrated acetous acids.

FLUOR *Albus* or *Uterinus,* in medicine, a kind of flux incident to women, popularly called the *whites.* See MEDICINE-*Index.*

FLUSHING, an handſome, ſtrong, and conſiderable town of the United Provinces, in Zealand, and in the iſland of Walcheren, with a very good harbour, and a great foreign trade. It was put into the hands of queen Elizabeth for a pledge of their fidelity, and as a ſecurity for the money ſhe advanced. It is one of the three places which Charles V. adviſed Philip II. to preſerve with care. E. Long. 3. 32. N. Lat. 51. 26.

FLUTE, an inſtrument of muſic, the ſimpleſt of all thoſe of the wind kind. It is played on by blowing it with the mouth; and the tones or notes are changed by ſtopping and opening the holes diſpoſed for that purpoſe along its ſide.

This is a very ancient inſtrument. It was at firſt called the flute *à bec,* from *bec* an old Gauliſh word ſignifying the beak of a bird or fowl, but more eſpecially of a cock; the term *flute á bec* muſt therefore ſignify the *beaked flute*; which appears very proper, on comparing it with the traverſe or German flute. The word *flute* is derived from *fluta,* the Latin for a lamprey or ſmall eel taken in the Sicilian ſeas, having ſeven holes immediately below the gills on each ſide, the preciſe number of thoſe in the front of the flute.

By Merſennus this inſtrument is called the *fiſtula dulcis, ſeu Anglica;* the loweſt note, according to him, for the treble flute, is *C fa ut,* and the compaſs of the inſtrument 15 notes. There is, however a flute known by the name of the *concert flute,* the loweſt note of which is F. Indeed, ever ſince the introduction of the flute into concerts, the loweſt note of the inſtrument, of what ſize ſoever it is, has been called F; when in truth its pitch is determinable only by its correſpondence in reſpect of acuteneſs or gravity with one or other of the chords in the *ſcala maxima* or great ſyſtem.

Beſides the true concert-flute, others of a leſs ſize were ſoon introduced into concerts of violins; in which caſe the method was to write the flute-part in a key correſpondent to its pitch. This practice was introduerd in 1710 by one Woodcock, a celebrated performer on this inſtrument, and William Babel organiſt of the church of All-hallows, Bread Street, London. They failed, however, in procuring for the flute a reception into concerts of various inſtruments; for which reaſon, one Thomas Staneſby, a very curious maker of flutes and other inſtruments of the like kind, about the year 1732, adverting to the ſcale of Merſennus, in which the loweſt note was C, invented what he called the *new ſyſtem*; in which, by making the flute of ſuch a ſize as to be a fifth above concert pitch, the loweſt note became *C ſol fa ut.* By this contrivance the neceſſity of tranſpoſing the flute part was taken away; for a flute of this ſize, adjuſted to the ſyſtem abovementioned, became an octave to the violin. To further this invention of Staneſby, one Lewis Merci, an excellent performer on the flute, publiſhed, about the year 1735, ſix ſolos for this inſtrument, three of which are ſaid to be accommodated to Mr Stanſbey's new ſyſtem; but the German flute was now become a favourite inſtrument, and Staneſby's ingenuity failed of its effect.—One great objection indeed lies againſt this inſtrument, which, however, equally effects all perforated pipes; namely, that they are never perfectly in tune, or cannot be made to play all their notes with equal exactneſs. The utmoſt that the makers of them can do is to tune them to ſome one key; as the hautboy to C, the German flute to D, and the Engliſh flute to F; and to effect this truly is a matter of no ſmall difficulty. The Engliſh flutes made by the younger Staneſby came the neareſt of any to perfection; but thoſe of Breſſian, though excellent in their tone, are all too flat in the upper octave. For theſe reaſons ſome are induced to think, that the utmoſt degree of proficiency on any of thoſe inſtruments is not worth the labour of attaining it.

Cerman FLUTE, is an inſtrument entirely different from the common flute. It is not, like that, put into the mouth to be played; but the end is ſtopt with a tompion or plug, and the lower lip is applied to a hole about two inches and a half or three inches diſtant from the end. This inſtrument is uſually about a foot and a half long; rather bigger at the upper end than the lower; and perforated with holes, beſides that for the mouth, the loweſt or which is ſtopped and opened by the little finger's preſſing on a braſs or ſometimes a ſilver key, like thoſe in hautboys, baſſoons, &c. Its ſound is exceeding ſweet and agreeable; and ſerves as a treble in a concert.

FLUTE, or FLUYT, is a kind of long veſſel, with flat ribs or floor-timbers, round behind, and ſwelled in the middle; ſerving chiefly for the carrying of proviſions in fleets or ſquadrons of ſhips; though it is often uſed in merchandize. The word *flute,* taken for a ſort of boat or veſſel, is derived, according to Borel, from the ancient *flotte,* a little boat. In the verbal proceſs of the miracles of St Catherine of Sweden, in the 12th century, we read *Unus equum ſuum una cum mercibus magni ponderis introduxit ſuper inſtrumentum lignis fabricatum, vulgariter dictum fluta.* Upon which the Bollandiſts obſerve, that in ſome copies it is read *flotta,* an inſtrument called by the Laints *ratis*; and that the word *flutta* or *flotta* aroſe from *flotten* or *vlotten,* "to float."

FLUTES, or FLUTINGS, in architecture, are perpendicular channels or cavities cut along the ſhaft of a column or pilaſter. They are ſuppoſed to have been firſt introduced in imitation of the plaits of womens robes; and are therefore called by the Latins *ſtriges* and *rugæ.* The French call them *cannelures,* as being excavations; and we, *flutes* or *flutings,* as bearing ſome reſemblance to the muſical inſtrument ſo called. They are chiefly affected in the Ionic order, in which they had their firſt riſe; though they are alſo uſed in all the richer orders, as the Corinthian and Compoſite; but rarely in the Doric, and ſcarce ever in the Tuſcan.

FLUX, in medicine, an extraordinary iſſue or evacuation of ſome humour. Fluxes are various and variouſly denominated according to their ſeats or the humours thus voided; as a flux of the belly, uterine flux, hepatic flux, ſalival flux, &c. The flux of the belly is of four kinds, which have each their reſpective denominations, viz. the *lientry,* or *fluxus lientericus*; the *cæliac,* or *fluxus chyloſus*; the *diarrhæa*; and the *dyſentry,* or *bloody flux*;—all which are properly treated of in MEDICINE.

FLUX, in hydrography, a regular periodical motion of the ſea, happening twice in 24 hours; wherein the water is raiſed and driven violently againſt the ſhores. The flux or flow is one of the motions of the tide; the other, whereby the water ſinks and retires, is called the reflux or ebb. There is alſo a kind of reſt or ceſſation of about half an hour between the flux and reflux; during which time the water is at its greateſt height, called *high-water.* The flux is made by the motion of the water of the ſea from the equator towards the poles; which, in its progreſs, ſtriking againſt the coaſts in its way, and meeting with oppoſition from them, ſwells, and where it can find paſſage, as in flats, rivers, &c riſes up and runs into the land. This motion follows, in ſome meaſure, the courſe of the moon;

as it looſes or comes later every day by about three quarters of an hour, or more preciſely, by 48 minutes; and by ſo much is the motion of the moon ſlower than that of the ſun. It is always higheſt and greateſt in full moons, particularly thoſe of the equinoxes. In ſome parts, as at Mount St Michael, it riſes 80 or 90 feet, though in the open ſea it never riſes above a foot or two; and in ſome places, as about the Morea, there is no flux at all. It runs up ſome rivers above 120 miles. Up the river Thames it only goes 80, viz. near to Kingſton in Surry. Above London bridge the water flows four hours and ebbs eight; and below the bridge, flows five hours and ebbs ſeven.

Flux, in metallurgy, is ſometimes uſed ſynonymouſly with *fuſion*. For inſtance, an ore, or other matter, is ſaid to be in liquid flux, when it is completely fuſed.

But the word *flux* is generally uſed to ſignify certain ſaline matters, which facilitate the fuſion of ores, and other matters which are difficultly fuſible in eſſays and reductions of ores. Fixed alkalis, nitre, borax, tartar, and common ſalt, are the ſaline matters of which fluxes are generally compoſed. But the word *flux* is more particularly applied to mixtures of different proportions of only nitre and tartar; and theſe fluxes are called by particular names according to the proportion of theſe ingredients, as in the following articles.

White **flux**, is made with equal parts of nitre and of tartar detonated together, by which they are alkaliſed. The reſiduum of this detonation is an alkali compoſed of the alkalis of the nitre and of the tartar, both which are abſolutely of the ſame nature. As the proportion of nitre in this mixture is more than is ſufficient to conſume entirely all the inflammable matter of the tartar, the alkali remaining after the detonation is perfectly white, and is therefore called *white flux*; and as this alkali is made very quickly, it is alſo called *extemporaneous alkali*. When a ſmall quantity only of white flux is made, as a few ounces for inſtance, ſome nitre always remains undecompoſed, and a little of the inflammable principle of the tartar, which gives a red or even a black colour to ſome part of the flux; but this does not happen when a large quantity of white flux is made; becauſe then the heat is much greater. This ſmall quantity of undecompoſed nitre and tartar which remains in white flux is not hurtful in moſt of the metallic fuſions in which this flux is employed: but if the flux be required perfectly pure, it might eaſily be diſengaged from thoſe extraneous matters by a long and ſtrong calcination, without fuſion.

Crude **Flux**. By crude flux is meant the mixture of nitre and tartar in any proportions, without detonation. Thus the mixture of equal parts of the two ſalts uſed in the preparation of the white flux, or the mixture of one part of nitre and two parts of tartar for the preparation of the black flux, are each of them a crude flux before detonation. It has alſo been called *white flux*, from its colour: but this might occaſion it to be confined with the white flux above deſcribed. The name, therefore, of crude flux is more convenient.

Crude flux is detonated and alkaliſed during the reductions and fuſions in which it is employed, and is then changed into white or black flux according to the proportion of which it is compoſed. This detonation produces good effects in theſe fuſions and reductions, if the ſwelling and extravaſation of the detonating matters be guarded againſt. Accordingly, crude flux may be employed ſucceſsfully in many operations; as, for inſtance, in the ordinary operation for procuring the regulus of antimony.

Black **Flux**. Black flux is produced from the mixture of two parts of tartar and one part of nitre detonated together. As the quantity of nitre which enters into the compoſition of this flux is not ſufficient to conſume all the inflammable matter of the tartar, the alkali which remains after the detonation contains much black matter, of the nature of coal, and is therefore called *black flux*.

This flux is deſignedly ſo prepared, that it ſhall contain a certain quantity of inflammable matter; for it is thereby capable, not only of facilitating the fuſion of metallic earths like the white flux, but alſo of reviving theſe metals by its phlogiſton. From this property it is alſo called *reducing flux*; the black flux, therefore, or crude flux made with ſuch proportions of the ingredients as to be convertible into black flux, ought always to be uſed when metallic matters are at once to be fuſed and reduced, or even when deſtructive metals are to be fuſed, as theſe require a continual ſupply of phlogiſton to prevent their calcination.

FLUXIONS;

A Method of calculation which greatly facilitates computations in the higher parts of mathematics. Sir Iſaac Newton and Mr Leibnitz contended for the honour of inventing it. It is probable they had both made progreſs in the ſame diſcovery, unknown to each other, before there was any publication on the ſubject.

In this branch of mathematics, magnitudes of every kind are ſuppoſed generated by motion: a line by the motion of a point, a ſurface by the motion of a line, and a ſolid by the motion of a ſurface. And ſome part of a figure is ſuppoſed generated by an uniform motion; in conſequence of which, the other parts may increaſe uniformly or with an accelerated or retarded motion, or may decreaſe in any of theſe ways; and the computations are made by tracing the comparative velocities with which the parts flow.

Plate CXCV.

Fig. 1. If the parallelogram ABCD be generated by an uniform motion of the line AB toward CD while it moves from FE towards *fe*, while the line BF receives the increment F*f*, and the figure will be increaſed by the parallelogram *Fe*; the line FE in this caſe undergoes no variation.

The fluxion of any magnitude at any point is the increment that it would receive in any given time, ſuppoſing it to increaſe uniformly from that point: and as the meaſures will be the ſame, whatever the time be, we are at liberty to ſuppoſe it leſs than any aſſigned time.

The firſt letters in the alphabet are uſed to repreſent invariable quantities; the letters x, y, z, variable quantities; and the ſame letters with points over them $\dot{x}$, $\dot{y}$, $\dot{z}$, repreſent their fluxions.

Therefore if AB$=a$, and BF$=x$; Ff, the fluxion of BF, will be $=x$, and Fe, the fluxion of AF, $=ax$.

If the rectangle be ſuppoſed generated by the uniform motion of FG towards CD, at the ſame time that HG moves uniformly towards AD, the point G keeping always on the diagonal, the lines FG, HG will flow uniformly; for while Bf receives the increment Ff, and HB the increment HK, FG will receive the increment hg, and HG the increment Gh, and they will receive equal increments in equal ſucceſſive times. But the parallelogram will flow with an accelerated motion; for while F flows to f, and H to K, it is increaſed by the gnomon KGf; but while F and H flow through the equal ſpaces fm KL, it is increaſed by the gnomon Lgm greater than KGf; conſequently when fluxions of the ſides of a parallelogram are uniform, the fluxion of the parallelogram increaſes continually.

The fluxion of the parallelogram BHGF is the two parallelograms KG and Gf; for though the parameter receives an increment of the gnomon KGf, while its ſides flow to f and K, the part gG is owing to the additional velocity wherewith the parallelogram flows during that time; and therefore is no part of the meaſure of the fluxion, which muſt be computed by ſuppoſing the parameter to flow uniformly as it did at the beginning, without any acceleration.

Therefore if the ſides of a parallelogram be x and y, their fluxions will be $\dot{x}\,\dot{y}$; and the fluxion of the parallelogram $\dot{x}y+y\dot{x}$; and if $x=y$, that is, if the figure be a ſquare, the fluxion of x_{2} will be $2x\dot{x}$.

Fig. 2. Let the triangle ABC be deſcribed by the uniform motion of DE from A towards B, the point E moving in the line DE, ſo as always to touch the lines AC, CB; while D moves from A to F, DE is uniformly increaſed, and the increaſe of the triangle is uniformly accelerated. When DE is in the poſition FC, it is a maximum. As D moves from F to B, the line DE decreaſes, and the triangle increaſes, but with a motion uniformly retarded.

Fig. 3. If the ſemicircle AFB be generated by the uniform motion of CD from A towards B, while C moves from A to G, the line CD will increaſe, but with a retarded motion; the circumference alſo increaſes with a retarded motion, and the circular ſpace increaſes with an accelerated motion, but not uniformly, the degrees of acceleration growing leſs as CD approaches to the poſition GF. When C moves from G to B, it decreaſes with a motion continually accelerated, the circumference increaſes with a motion continually accelerated, and the area increaſes with a motion continually retarded, and more quickly retarded as CD approaches to B.

The fluxion of a quantity which decreaſes is to be conſidered as negative.

When a quantity does not flow uniformly, its fluxion may be repreſented by a variable quantity, or a line of a variable length; the fluxion of ſuch a line is called the *ſecond fluxion of the quantity whoſe fluxion that line is*: and if it be variable, a third fluxion may be deduced from it, and higher orders from theſe in the ſame manner: the ſecond fluxion is repreſented by two points as $\ddot{x}$

The increment a quantity receives by flowing for any given time, contains meaſures of all the different orders of fluxions; for if it increaſes uniformly, the whole increment is the firſt fluxion; and it has no ſecond fluxions. If it increaſes with a motion uniformly accelerated, the part of the increment occaſioned by the firſt motion meaſures the firſt fluxion, and the parts occaſioned by the acceleration meaſures the ſecond fluxion. If the motion be not only accelerated, but the degree of acceleration continually increaſed, the two firſt fluxions are meaſured as before: and the part of the increment occaſioned by the additional degree of acceleration meaſures the third; and ſo on. Theſe meaſures require to be corrected, and are only mentioned here to illuſtrate the ſubject.

DIRECT METHOD.

Any flowing quantity being given to find its fluxion.

Rule I. To find the fluxion of any power of a quantity, multiply the fluxion of the root by the exponent of the power, and the product by a power of the ſame root leſs by unity than the given exponent.

The fluxion of x^3 is $3x^2\dot{x}$, of x^n, $nx^{n-1}\dot{x}$; for the root of x^n is x, whoſe fluxion is $\dot{x}$; which multiplied by the exponent n, and by a power of x leſs by unity than n, gives the above fluxion.

If x receive the increment $\dot{x}$, it becomes $x+\dot{x}$; raiſe both to the power of n, and x^n becomes $x^n+nx^{n-1}\dot{x}+\frac{n.n-1}{2}x^{n-2}\dot{x}^2+$, &c.; but all the parts of the increment, except the firſt term, are owing to the accelerated increaſe of x^n, and form meaſures of the higher fluxions. The firſt term only meaſures the firſt fluxion. The fluxion of $\overline{a^2+z^2}|^{\frac{3}{2}}$ is $\frac{3}{2}\times 2z\dot{z}\times\overline{a^2+z^2}|^{\frac{1}{2}}$; for put $x=a^2+z^2$, we have $\dot{x}=2z\dot{z}$; and the fluxion of $x^{\frac{3}{2}}$, which is equal to the propoſed fluent, is $\frac{3}{2}x^{\frac{1}{2}}\dot{x}$; for which ſubſtituting the values of z and x we have the above fluxion.

Rule II. To find the fluxion of the product of ſeveral variable quantities multiplied together, multiply the fluxion of each by the product of the reſt of the quantities, and the ſum of the products thus ariſing will be the fluxion ſought.

Thus the fluxion of xy, is $x\dot{y}+y\dot{x}$; that of xyz, is $xy\dot{z}+xz\dot{y}+yz\dot{x}$; and that of $xyzu$, is $xyz\dot{u}+xyu\dot{z}+xzu\dot{y}+yzu\dot{x}$.

Rule III. To find the fluxion of a fraction—From the fluxion of the numerator multiplied by the denominator, ſubtract the fluxion of the denominator multiplied by the numerator, and divide the remainder by the ſquare of the denominator.

Thus, the fluxion of $\frac{x}{y}$ is $\frac{y\dot{x}-x\dot{y}}{y^2}$; that of $\frac{x}{x+y}$, is

$$\frac{\dot{x}\times\overline{x+y}-\dot{x}-\dot{y}\,\overline{x\,x}}{\overline{x+y}|^2}=\frac{y\dot{x}-x\dot{y}}{\overline{x+y}|^2}$$

Rule IV. In complex caſes, let the particulars be collected from the ſimple rules, and combined together.

The fluxion of $\frac{x^2y^2}{z}$ is $\frac{\overline{2x^2y\dot{y}+2y^2x\dot{x}}\times z-x^2y^2\dot{z}}{z^2}$; for the fluxion of x^2 is $2x\dot{x}$, and of y^2 is $2y\dot{y}$, by Rule I. and therefore the fluxion of x^2y^2 is (by Rule II.) $2x^2y\dot{y}+2y^2x\dot{x}$; which multiplied by z, (by Rule III.) and ſubtracting from it the fluxion of the denominator z, multiplied by the numerator, and dividing the whole by the ſquare of the denominator, gives the above fluxion.

Rule V. The ſecond fluxion is derived from the firſt, in the ſame manner as the firſt from the flowing quantity.

Thus the fluxion of x^3, $3x^2\dot{x}$; its ſecond, $6x\dot{x}^2+3x^2\ddot{x}$ (by Rule II.); and ſo on; but if $\dot{x}$ be invariable, $\ddot{x}=0$, and the ſecond fluxion of $x^3=6x\dot{x}^2$.

Prob. I. *To determine maxima and minima.*

When a quantity increaſes, its fluxion is poſitive; when it decreaſes, it is negative; therefore when it is juſt betwixt increaſing and decreaſing, its fluxion is $=0$.

Rule. Find the fluxion, make it $=0$, whence an equation will reſult that will give an anſwer to the queſtion.

Examp. To determine the dimenſions of a cylindric meaſure ABCD, (fig. 4.) open at the top, which ſhall contain a given quantity (of liquor, grain, &c.) under the leaſt internal ſuperficies poſſible.

Let the diameter AB$=x$, and the altitude BD$=y$; moreover, let p. (3,14159, &c.) denote the periphery of the circle whoſe diameter is unity, and let c be the given content of the cylinder. Then it will be $1:p::x:(px)$ the circumference of the baſe; which, multiplied by the altitude y, gives pxy for the concave ſuperficies of the cylinder. In like manner, the area of the baſe, by multiplying the ſame expreſſion into $\frac{1}{4}$ of the diameter x, will be found $=\frac{px^2}{4}$; which drawn into the altitude y, gives $\frac{px^2y}{4}$ for the ſolid content of the cylinder; which being made $=c$, the concave ſurface pxy will be found $=\frac{4c}{x}$, and conſequently the whole ſurface $=\frac{4c}{x}+\frac{px^2}{4}$: Whereof the fluxion, which is $-\frac{4c\dot{x}}{x^2}+\frac{px\dot{x}}{2}$ being put$=0$, we ſhall get $-8c\times px^3=0$; and therefore $x=2\sqrt[3]{\frac{c}{p}}$: further, becauſe $px^3=8c$, and $px^2y=4c$, it follows, that $x=2y$; whence y is alſo known, and from which it appears that the diameter of the baſe muſt be juſt double of the altitude.

Fig. 7. To find the longeſt and ſhorteſt ordinates of any curve, GEF, whoſe equation or the relation which the ordinates bear to the abſciſſas is known.

Make AC the abſciſſa $=x$, and CE the ordinate $=y$; take a value of y in terms of x, and find its fluxion; which making $=0$, an equation will reſult whoſe roots give the value of x when y is a maximum or a minimum.

To determine when it is a maximum and when a minimum, take the value of y, when x is a little more than the root of the equation ſo found, and it may be perceived whether it increaſes or decreaſes.

If the equation has an even number of equal roots, y will be neither a maximum nor minimum when its fluxion is $=0$.

Prob. II. *To draw a tangent to any curve.*

Fig. 5. When the abſciſſa CS of a curve moves uniformly from A to B, the motion of the curve will be retarded if it be concave, and accelerated if convex towards AB; for a ſtraight line TC is deſcribed by an uniform motion, and the fluxion of the curve at any point is the ſame as the fluxion of the tangent, becauſe it would deſcribe the tangent if it continued to move equably from that point. Now if S*s* or C*e* be the fluxion of the baſe, C*d* will be the fluxion of the tangent, and *de* of the ordinate. And becauſe the triangles TSC, C*ed*, are equiangular, *de* : C*e* :: CS : ST, wherefore,

Rule. Find a fourth proportional to the fluxion of the ordinate valued in terms of the abſciſſa, the fluxion of the abſciſſa, and the ordinate, and it determines the line ST, which is called the *ſubtangent*, and TC joined is a tangent to the curve.

Examp. To draw a right line CT, (fig. 6.) to touch a given circle BCA in a point C.

Let CS be perpendicular to the diameter AB, and put AB$=a$, BS$=x$, and SC$=y$: then, by the property of the circle, y^2 (CS^2) $=$ BS$\times$AS $(=x\times\overline{a-x})=ax-x^2$; whereof the fluxion being taken, in order to determine the ratio of $\dot{x}$ and $\dot{y}$, we get $2y\dot{y}=a\dot{x}-2x\dot{x}$; conſequently $\frac{\dot{x}}{\dot{y}}=\frac{2y}{a-2x}=\frac{y}{\frac{1}{2}a-x}$; which multiplied by y, gives $\frac{y\dot{x}}{\dot{y}}=\frac{y^2}{\frac{1}{2}a-x}=$ the ſubtangent ST. Whence (O being ſuppoſed the centre) we have OS $(\frac{1}{2}a-x)$: CS (y) :: CS (y) : ST; which we alſo know from other principles.

Prob. III. *To determine points of contrary flexure in curves.*

Fig. 7. Suppoſing C to move uniformly from A to B, the curve GEF will be convex towards AB when the celerity of E increaſes, and concave when it decreaſes; therefore, at the point where it ceaſes to be convex and begins to be concave, or the oppoſite way, the celerity of E will be uniform, that is, CE will have no ſecond fluxion. Therefore,

Rule. Find the ſecond fluxion of the ordinate in terms of the abſciſſa, and make it $=0$; and from the equation that ariſes you get a value of the abſciſſa, which determines the point of contrary flexure.

Ex. Let the nature of the curve AGE be defined by the equation $ay=a^{\frac{3}{2}}x^{\frac{1}{2}}+xx$, (the abſciſſa AF and the ordinate FG being, as uſual, repreſented by x and y reſpectively). Then $\dot{y}$ expreſſing the celerity of the point G, in the line FH, will be equal to $\frac{\frac{1}{2}a^{\frac{2}{3}}x^{-\frac{1}{2}}\dot{x}+2x\dot{x}}{a}$: Whoſe fluxion, or that of $\frac{1}{2}a^{\frac{3}{2}}x^{-\frac{1}{2}}+2x$ (becauſe a

and $\dot{x}$ are conſtant) muſt be equal to nothing; that is, $-\frac{1}{4}ax^{-\frac{3}{2}}\dot{x}+2\dot{x}=0$: Whence $a^{\frac{3}{2}}x^{-\frac{3}{2}}=8$, $a^{\frac{3}{2}}=8x^{\frac{3}{2}}$ $64x^3=a^3$, and $x=\frac{1}{4}a=$AF; therefore FG $\left(=\frac{a^{\frac{3}{2}}x^{\frac{1}{2}}+xx}{a}\right)$ $=\frac{9}{16}a$: From which the poſition of the point G is given.

PROB. IV. *To find the radii of curvature.*

THE curvature of a circle is uniform in every point, that of every other curve continually varying: and it is meaſured at any point by that of a circle whoſe radius is of ſuch a length as to coincide with it in curvature in that point.

All curves that have the ſame tangent have the ſame firſt fluxion, becauſe the fluxion of a curve and its tangent are the ſame. If it moved uniformly on from the point of contact, it would deſcribe the tangent. And the deflection from the tangent is owing to the acceleration or retardation of its motion, which is meaſured by its ſecond fluxion: and conſequently two curves which have not only the ſame tangent, but the ſame curvature at the point of contact, will have both their firſt and ſecond fluxions equal. It is eaſily proved from thence, that the radius of curvature is $=\frac{\dot{z}^3}{-\dot{x}\ddot{y}}$; x, y, and z, repreſenting the abſciſſa, ordinate, and curve reſpectively.

EXAMP. Let the given curve be the common parabola, whoſe equation is $y=a^{\frac{1}{2}}x^{\frac{1}{2}}$: Then will $\dot{y}=\frac{1}{2}a^{\frac{1}{2}}\dot{x}x^{-\frac{1}{2}}$ $=\frac{a^{\frac{1}{2}}\dot{x}}{2x^{\frac{1}{2}}}$, and (making $\dot{x}$ conſtant) $\ddot{y}=\frac{1}{2}\times\frac{1}{2}a^{\frac{1}{2}}\dot{x}^2x^{-\frac{3}{2}}=$ $\frac{-a^{\frac{1}{2}}\dot{x}^2}{4x^{\frac{3}{2}}}$: Whence $\dot{z}$ $\left(\sqrt{\dot{x}^2+\dot{y}^2}\right)=\frac{\dot{x}}{2}\sqrt{\frac{4x+a}{x}}$, and the radius of curvature $\left(\frac{\dot{z}^3}{-\dot{x}\ddot{y}}\right)=\frac{\overline{a+\dot{4}}^{\frac{3}{2}}}{2\sqrt{a}}$: Which at the vertex where $x=0$, will be $=\frac{1}{2}a$.

INVERSE METHOD.

From a given fluxion to find a fluent.

THIS is done by tracing back the ſteps of the direct method. The fluxion of x is $\dot{x}$; and therefore the fluent of $\dot{x}$ is x: but as there is no direct method of finding fluents, this branch of the art is imperfect. We can aſſign the fluxion of every fluent; but we cannot aſſign the fluent of a fluxion, unleſs it be ſuch a one as may be produced by ſome rule in the direct method from a known fluent.

GENERAL RULE. Divide by the fluxion of the root, add unity to the exponent of the power, and divide by the exponent ſo increaſed.

For dividing the fluxion $nx^{n-1}\dot{x}$ by $\dot{x}$ (the fluxion of the root x) it becomes nx^{n-1}; and, adding 1 to the exponent $(n-1)$, we have nx^n; which divided by n, gives x^n, the true fluent of $xn^{n-1}\dot{x}$.

Hence (by the ſame rule) the

Fluent of $3x^2\dot{x}$ will be $=x^3$;

That of $8x^2\dot{x}=\frac{8x^3}{3}$;

That of $2x^5\dot{x}=\frac{x^6}{3}$

That of $y^{\frac{1}{2}}\dot{y}=\frac{2}{3}y^{\frac{3}{2}}$.

Sometimes the fluent ſo found requires to be corrected. The fluxion of x is $\dot{x}$, and the fluxion of $a+x$ is alſo $\dot{x}$; becauſe a is invariable, and has therefore no fluxion.

Now wen the fluent of $\dot{x}$ is required, it muſt be determined, from the nature of the problem, whether any invariable part, as a, muſt be added to the variable part x.

When fluents cannot be exactly found, they can be approximated by infinite ſeries.

EX. Let it be required to approximate the fluent of $\frac{\overline{a^2-x^2}|^{\frac{1}{2}}\times x^n\dot{x}}{\overline{c^2-x^2}|^{\frac{1}{2}}}$ in an infinite ſeries.

The value of $\frac{\overline{a^2-x^2}|^{\frac{1}{2}}}{\overline{c^2-x^2}|^{\frac{1}{2}}}$, expreſſed in a ſeries, is $\frac{a}{c}+$ $\overline{\frac{a}{2c^3}-\frac{1}{2ac}}\times x^2+\overline{\frac{3a}{8c^5}-\frac{1}{4ac^3}-\frac{1}{8a^3c}}\times x^4+\overline{\frac{5a}{16c}-\frac{3}{16ac}-\frac{1}{16a^3c^3}-\frac{1}{16a^5c}}\times x^6+$&c. Which value being therefore multiplied by $x^n\dot{x}$, and the fluent taken (by the common method) we get $\frac{ax^{n+1}}{\overline{n+1}\times c}+\overline{\frac{a}{2c^3}-\frac{1}{2ac}}\times\frac{x^{n+3}}{n+3}+$ $\overline{\frac{3a}{8c^5}-\frac{1}{4ac^3}-\frac{1}{8a^3c}}\times\frac{x^{n+5}}{n+5}+$ $\overline{\frac{5a}{16c^7}-\frac{3}{16ac^5}-\frac{1}{16a^3c^3}-\frac{1}{16a^5c}}\times\frac{x^{n+7}}{n+7}+$&c.

PROB. I. *To find the area of any curve.*

RULE. Multiply the ordinate by the fluxion of the abſciſſa, and the product gives the fluxion of the figure, whoſe fluent is the area of the figure.

EXAMP. I. Fig. 8. Let the curve ARMH, whoſe area you would find, be the common parabola. Let u repreſent the area, and $\dot{u}$ its fluxion.

In which caſe the relation of AB. (x) and BR (y) being expreſſed by $y^2=ax$ (where a is the parameter) we thence get $y=a^{\frac{1}{2}}x^{\frac{1}{2}}$; and therefore $\dot{u}=$ RmHB $(=y\dot{x})$ $=a^{\frac{1}{2}}x^{\frac{1}{2}}\dot{x}$: whence $u=\frac{2}{3}\times a^{\frac{1}{2}}x^{\frac{3}{2}}=\frac{2}{3}a^{\frac{1}{2}}x^{\frac{1}{2}}\times x=\frac{2}{3}yx$ (becauſe $a^{\frac{1}{2}}x^{\frac{1}{2}}=y$) $=\frac{2}{3}\times$ AB $\times$ BR: hence a parabola is $\frac{2}{3}$ of a rectangle of the ſame baſe and altitude.

EXAMP. 2. Let the propoſed curve CSDR (fig. 9.) be of ſuch a nature, that (ſuppoſing AB unity) the ſum of the areas CSTBC and CDGBC anſwering to any two propoſed abſciſſas AT and AG, ſhall be equal to the area CRNBC, whoſe correſponding abſciſſa AN is equal to AT×AG, the product of the meaſures of the two former abciſſas.

Firſt, in order to determine the equation of the curve (which muſt be known before the area can be found), let the ordinates GD and NR move parallel to themſelves towards HF; and then having put GD$=y$, NR$=z$, AT$=a$, AG$=s$, and AN$=u$, the fluxion of the area CDGB will be repreſented by $y\dot{s}$, and that of the area CRNB by $z\dot{u}$: which two expreſſions muſt, by the nature of the problem, be equal to each other; becauſe the latter area CRNB exceeds the former CDGB by the area CSTB, which is here conſidered as a conſtant quantity: and it is evident, that two expreſſions, that differ only by a conſtant quantity, muſt always have equal fluxions.

Since, therefore, $y\dot{s}$ is $=z\dot{u}$, and $u=as$, by hypotheſis, it follows, that $\dot{u}=a\dot{s}$, and that the firſt equation (by ſubſtituting for $\dot{u}$) will become $y\dot{s}=az\dot{s}$, or $y=az$, or laſtly $ys=zas$, that is, GD×AG=NR×AN: therefore, GD : NR :: AN : AG; whence it appears, that every ordinate of the curve is reciprocally as its correſponding abſciſſa.

Now, to find the area of the curve ſo determined, put AB$=1$, BC$=b$, and BG$=x$: then, ſince AG $(1+x)$: AB (1) :: BC (b) : GD (y) we have $y=\frac{b}{1+x}$, conſequently $\dot{u}$ $(=y\dot{x})=\frac{b\dot{x}}{1+x}=b\times\dot{x}-x\dot{x}+x^2\dot{x}-x^3\dot{x}+x^4\dot{x}-$ &c. Whence BGDC, the area itſelf will be $=b\times x-\frac{x^2}{2}+\frac{x^3}{3}-\frac{x^4}{4}+\frac{x^5}{5}$, &c. which was to be found.

Hence it appears, that as theſe areas have the ſame properties as logarithms, this ſeries gives an eaſy method of computing logarithms; and the fluent may be found by means of a table of logarithms, without the trouble of an infinite ſeries: and every fluxion whoſe fluent agrees with any known logarithmic expreſſion, may be found the ſame way. Hence the fluents of fluxions of the following forms are deduced.

The fluent of $\frac{\dot{x}}{\sqrt{x^3\pm a^2}}=$hyp.log.of $x+\sqrt{x^2\pm a^2}$;

of $\frac{\dot{x}}{\sqrt{2ax+xx}}=$hyp. log. of $a\times x+\sqrt{2ax+x^2}$;

of $\frac{2a\dot{x}}{a^2-x^2}=$ hyp. log. of $\frac{a+x}{a-x}$

and of $\frac{2a\dot{x}}{x\sqrt{a^2\pm x^2}}=$hyp. log. of $\frac{a-\sqrt{a^2\pm x^2}}{a+\sqrt{a^2\pm x^2}}$

PROB. 2. *To determine the length of curves.*

Fig. 5. Becauſe C*de* is a right-angled triangle, $Cd^2=Ce^2+de^2$; wherefore the fluxions of the abſciſſa and ordinate being taken in the ſame terms and ſquared, their ſum gives the ſquare of the fluxion of the curve; whoſe root being extracted, and the fluent taken, gives the length of the curve.

EXAMP. To find the length of a circle from its tangent. Make the radius AO (fig. 5.) $=a$, the tangent of AC$=t$. and its ſecant $=s$, the curve $=z$, and its fluxion $=\dot{z}$; becauſe the triangles OTC, OCS, are ſimilar, OT : OC :: OC : OS; whence OS $=\frac{a^2}{s}$, and SA$=a-\frac{a^2}{s}=a-\frac{a^2}{\sqrt{a^2+t^2}}$; whoſe fluxion is $\frac{a^2t\dot{t}}{\overline{a^2+t^2}|^{\frac{3}{2}}}$; and becauſe the triangles OTC, *d*C*e* are ſimilar, TC $(=t)$: TO $(=\sqrt{a^2+t^2})$ :: C*e* $=\left(\frac{a^2t\dot{t}}{\overline{a^2+t^2}|^{\frac{3}{2}}}\right)$: C$d=\frac{a^2\dot{t}}{a^2+t^2}=$ fluxion of the curve. Now by converting this into an infinite ſeries we have the fluxion of the curve $=\dot{t}-\frac{t^2\dot{t}}{a^2}+\frac{t^4\dot{t}}{a^4}-\frac{t^6\dot{t}}{a^6}$, &c. and conſequently $z=t-\frac{t^3}{3a^2}+\frac{t^5}{5a^4}-\frac{t^7}{7a^6}+\frac{t^9}{9a^8}$, &c. $=$ A C. Where, if (for example's ſake) AC be ſuppoſed an arch of 30 degrees, and AO (to render the operation more eaſy) be put $=$ unity, we ſhall have $t=\sqrt{\frac{1}{3}}=.5773502$ (becauſe OS $(\sqrt{\frac{3}{4}})$: SC $(\frac{1}{2})$ :: OA (1) : CT $(t)=\sqrt{\frac{1}{3}}$) Whence,

t^3 $(=t\times t^2=t\times\frac{1}{3})=.1924500$

t^5 $\left(=t^3\times t^2=\frac{t^3}{3}\right)=.0641500$

t^7 $\left(=t^5\times t^2=\frac{t^5}{3}\right)=.0213833$

t^9 $\left(=t^7\times t^2=\frac{t^7}{3}\right)=.0071277$

t^{11} $\left(=t^9\times t^2=\frac{t^9}{3}\right)=.0023759$

t^{13} $\left(=t^{11}\times t^2=\frac{t^{11}}{3}\right)=.0007919$

t^{15} $\left(=t^{13}\times t^2=\frac{t^{13}}{3}\right)=.0002639$

&c.

And therefore AC $=.5773502-\frac{.1934500}{3}+\frac{.0641500}{5}-\frac{.0213833}{7}+\frac{.0091277}{9}-\frac{.0023759}{11}+\frac{.0007919}{13}-\frac{.0002639}{15}+\frac{.0000879}{17}-\frac{.0000293}{19}+\frac{.0000097}{21}-\frac{.0000032}{23}+=.5235987$: for the length of an arch of 30 degrees, which multiplied by 6 gives 3.141592 + for the length of the ſemi-periphery of the circle whoſe radius is unity.

Other ſeries may be deduced from the verſed ſine and ſecant; and theſe are of uſe for finding fluents which cannot be expreſſed in finite terms.

$$\text{the fluent of}\left\{\begin{array}{c}\frac{\dot{w}}{\sqrt{2aw-w^2}}\\[2ex] \frac{\dot{w}}{\sqrt{a^2-w^2}}\\[2ex] \frac{a\dot{w}}{a^2+w^2}\\[2ex] \frac{a\dot{w}}{w\sqrt{w^2-a^2}}\end{array}\right\}\text{is equal to the arch whoſe}\left\{\begin{array}{l}\text{Verſed ſine}\\[2ex] \text{Right ſine}\\[2ex] \text{Tangent}\\[2ex] \text{Secant}\end{array}\right\}\text{is }\frac{w}{a}\text{, and Radius Unity.}$$

Prob. III. *To find the contents of a ſolid.*

Let the ſurface of the generating plane be multiplied by the ſpace it paſſes through in any time, the product will give a ſolid which is the fluxion of the ſolid required: the ſurface muſt therefore be computed in terms of x, which repreſents the line or axis on which it moves, and by its motion on which the fluxion is to be meaſured, and the fluent found will give the contents of the ſolid.

Examp. Let it be propoſed to find the content of a cone ABC, fig. 10.

Put the given altitude (AD) of the cone $=a$, and the ſemidiameter (BD) of its baſe $=b$, the ſolid $=s$, its fluxion $=\dot{s}$, and the area of a circle whoſe radius is unity, $=p$: then the diſtance (AF) of the circle EG, from the vertex A, being denoted by x, we have, by ſimilar triangles, as $a : b :: x :$ EF $(y) = \frac{bx}{a}$. Whence in this caſe, $\dot{s}\ (=py^2\dot{x}) = \frac{pb^2x^2\dot{x}}{a^2}$; and conſequently $s = \frac{pb^2x^3}{3a^2}$; which, when $x=a\,(=\text{AD})$ gives $\frac{pb^2a}{3}\ (=p\times\text{BD}^2\times\frac{1}{3}\text{AD})$ for the content of the whole cone ABC: which appears from hence to be juſt $\frac{1}{3}$ of a cylinder of the ſame baſe and altitude.

Prob. IV. *To compute the ſurface of any ſolid body.*

The fluxion of the ſurface of the ſolid is equal to the periphery of the ſurface, by whoſe motion the ſolid is generated, multiplied by its velocity on the edge of the ſolid, and the computation is made as in the foregoing.

Examp. Let it be propoſed to determine the convex ſuperficies of a cone ABC, fig. 11.

Then, the ſemidiameter of the baſe (BD or CD) being put $=b$, the ſlanting line or hypothenuſe AC$=c$, and FH (parallel to DC) $=y$, AH$=z$, the ſurface $=w$, its fluxion $=\dot{w}$, and $p=$ the periphery of a circle whoſe diameter is unity, we ſhall, from the ſimilarity of the triangles ADC and Hmh, have $b : c :: \dot{y}\ (mh) : \dot{z}\ (\text{H}h) = \frac{c\dot{y}}{b}$: whence $\dot{w}\ (2py\dot{z}) = \frac{2pcy\dot{y}}{b}$; and conſequently $w = \frac{pcy^2}{b}$. This, when $y=b$, becomes $=pcb=p\times\text{DC}\times\text{AC}=$ the convex ſuperficies of the whole cone ABC: which therefore is equal to a rectangle under half the circumference of the baſe and ſlanting line.

The method of fluxions is alſo applied to find the centres of gravities, and oſcillation of different bodies; to determine the paths deſcribed by projectiles and bodies acted on by central forces, with the laws of centripetal force in different curves, the retardates given to motions performed in reſiſting medii, the attractions of bodies under different forms, the direction of wind which has the greateſt effect on an engine, and to ſolve many other curious and uſeful problems.

Fly.

FLY, in zoology, a larger order of inſects, the diſtinguiſhing characteriſtic of which is, that their wings are tranſparent. By this they are diſtinguiſhed from beetles, butterflies, graſshoppers, &c.

Flies are ſubdivided into thoſe which have four, and thoſe which have two wings.

Of thoſe with four wings there are ſeveral genera or kinds; as the ant, apis, ichneumon, &c. See Apis, Formica, &c.

Of thoſe with two wings, there are likewiſe ſeveral kinds, as the gad-fly, gnat, &c. See *Gad-Fly*, &c.

Thoſe who deſire a more particular account of the anatomy, generation, ſtructure, and manifold ſubdiviſions of flies, may conſult Reaumer's Hiſtory of Inſects, tom. 4. See alſo Entomology.

Houſe-Fly. See Musca.

Peſtilential-Fly. See Ethiopia, n° 11.

Fly, in mechanics, a croſs with leaden weights at its ends; or rather, a heavy wheel at right angles, to the axis of a windlaſs, jack, or the like; by means of which, the force of the power, whatever it is, is not only preſerved, but equally diſtributed in all parts of the revolution of the machine. See Mechanics.

Flies for Fiſhing. See *Fishing-Fly*.

Vegetable Fly, a very curious natural production chiefly found in the Weſt Indies. "Excepting that it has no wings, it reſembles the drone both in ſize and colour more than any other Britiſh inſect. In the month of May it buries itſelf in the earth, and begins to vegetate. By the latter end of July, the tree is arrived at its full growth, and reſembles a coral branch; and is about three inches high, and bears ſeveral little pods, which dropping off become worms, and from thence flies, like the Britiſh caterpillar."

Fly.

Such was the account originally given of this extraordinary production. But ſeveral boxes of theſe flies having been ſent to Dr Hill for examination, his report was this: "There is in Martinique a fungus of the clavaria kind, different in ſpecies from thoſe hitherto known. It produces ſoboles from its ſides; I call it therefore *clavaria ſobolifera*. It grows on putrid animal bodies, as our *fungus ex pede equino* from the dead horſe's hoof. The cicada is common in Martinique, and in its nympha ſtate, in which the old authors call it *tettigometra:* it buries itſelf under dead leaves to wait its change; and when the ſeaſon is unfavourable, many periſh. The ſeeds of the clavaria find a proper bed on this dead inſect, and grow. The tettigometra is among the cicadæ in the Britiſh muſeum: the clavaria is juſt now known. This is the fact, and all the fact; though the untaught inhabitants ſuppoſe a fly to vegetate, and though there is a Spaniſh drawing of the plants growing into a trifoliate tree, and it has been figured with the creature flying with this tree upon its back."

Phil. Tranſ. for 1763.

The ingenious Mr Edwards has taken notice of this extraordinary production in his Gleanings of Natural Hiſtory, from which the figures on Plate CXCVI. are taken,

Fly-Boat, or *Flight*, a large flat-bottomed Dutch veſſel,

FLUXIONS.

Fig. 1.

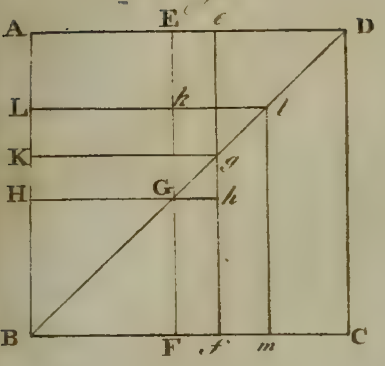


Fig. 2.

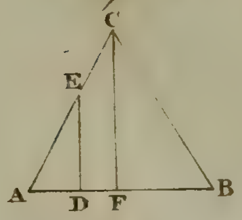


Fig. 3.

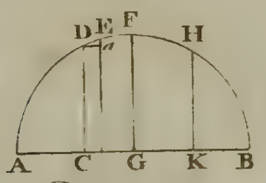


Fig. 4.

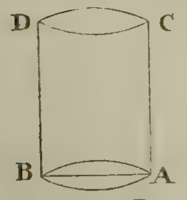


Fig. 5.

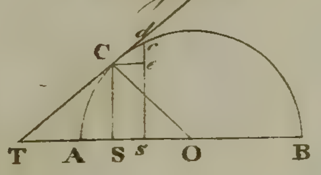


Fig. 6.

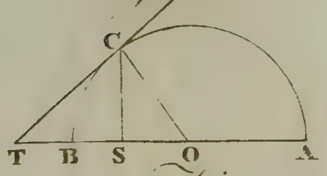


Fig. 7.

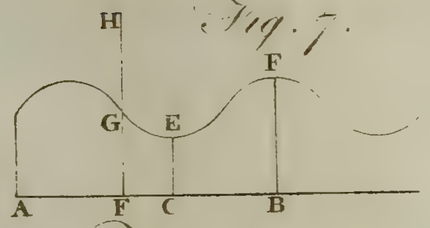


Fig. 8.

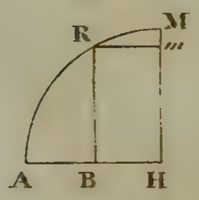


Fig. 9.

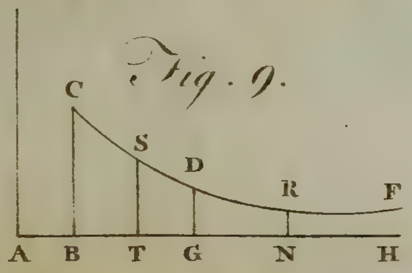


Fig. 10.

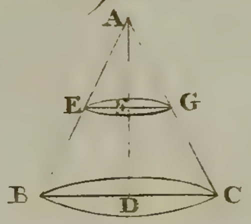
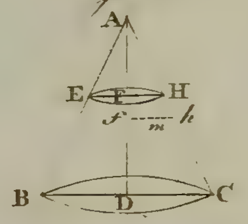
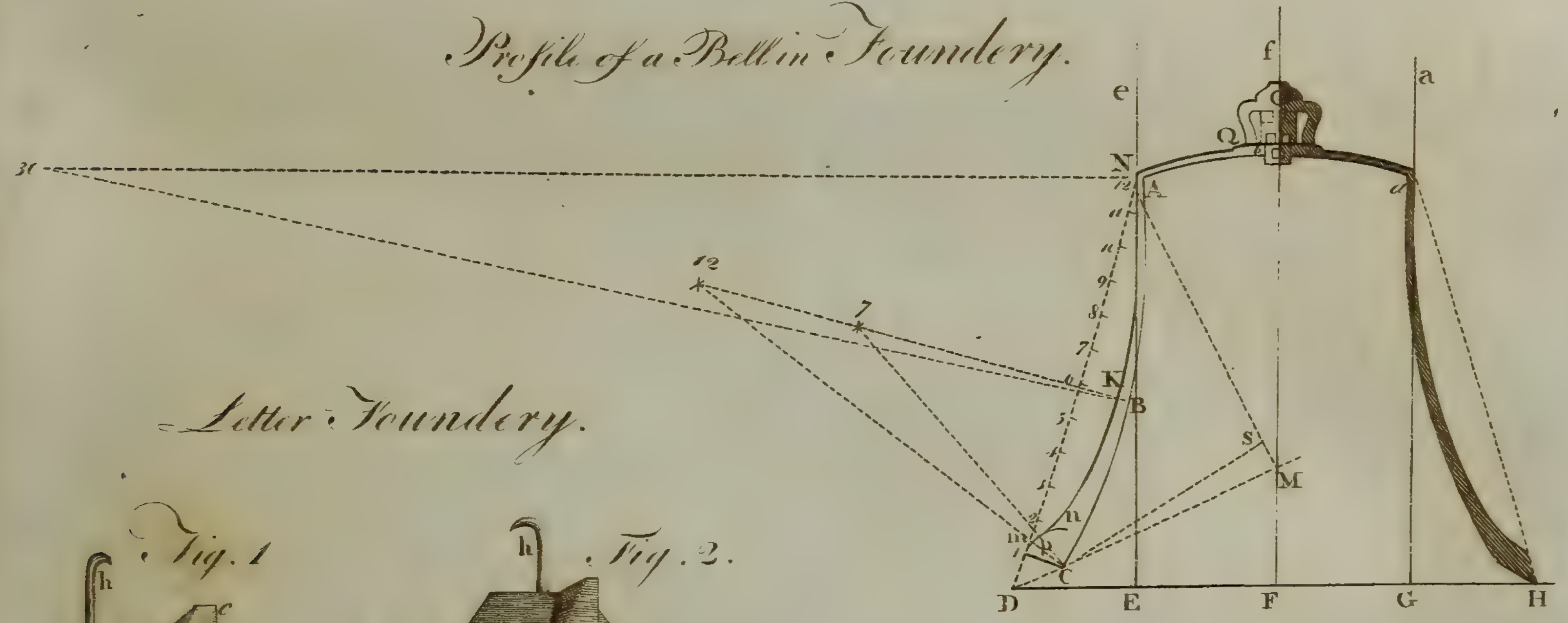


Fig. 11.



FOUNDERY.

Profile of a Bell in Foundery.



Letter Foundery.

Fig. 1

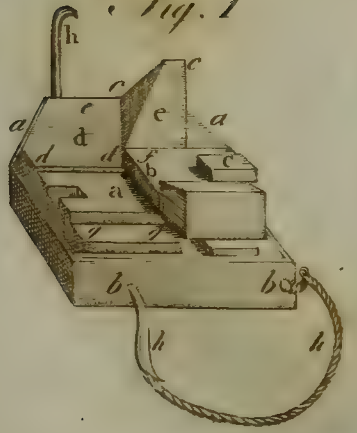
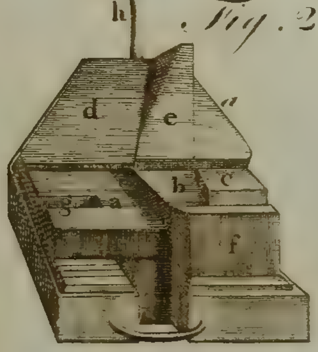
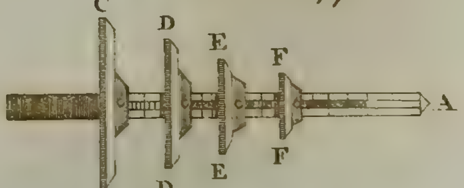


Fig. 2.



Fore staff.



veſſel, whoſe burden is generally from 600 to 1200 tons. It is diſtinguiſhed by a ſtern remarkably high, reſembling a Gothic turret, and by very broad buttocks below.

Fly-Catcher, in zoology. See Muscicapa.

Fly-Trap, in botany, a newly diſcovered ſenſitive plant. See *Dionæa Muſcipula*.

Fly-Tree, in natural hiſtory, a name given by ſome people of America to a tree, whoſe leaves, they ſay, at a certain time of the year produce *flies*. On examining theſe leaves about the middle of ſummer, the time at which the flies uſed to be produced, there are found on them a ſort of bag of a tough matter, of about the ſize of a filbert, and of a duſky greeniſh colour. On opening one of theſe bags with a knife, there is uſually found a ſingle full-grown fly, of the gnat kind, and a number of ſmall worms, which in a day or two more have wings, and flee away in the form of their parent. The tree is of the mulberry kind, and its leaves are uſually very largely ſtocked with theſe inſect-bags; and the generality of them are found to contain the inſects in their worm-ſtate; when they become winged, they ſoon make their way out. The bags begin to appear when the leaves are young, and afterwards grow with them; but they never rumple the leaf or injure its ſhape. They are of the kind of leaf-galls, and partake in all reſpects, except ſize, of a ſpecies we have frequent on the large maple, or, as it is called, the *ſycamore*.

FLYERS, in architecture, ſuch ſtairs as go ſtraight, and do not wind round, nor have the ſteps made tapering; but the fore and back part of each ſtair and the ends reſpectively parallel to one another: So that if one flight do not carry you to your deſigned height, there is a broad half ſpace; and then you fly again, with ſteps every where of the ſame breadth and length as before.

Flyers, the performers in a celebrated exhibition among the Mexicans, which was made on certain great feſtivals, and is thus deſcribed by Clavigero in his Hiſtory of that people. "They ſought in the woods for an extremely lofty tree, which after ſtripping it of its branches and bark, they brought to the city, and fixed in the centre of ſome large ſquare. They caſed the point of the tree in a wooden cylinder, which, on account of ſome reſemblance in its ſhape, the Spaniards called a *mortar*. From this cylinder hung four ſtrong ropes, which ſerved to ſupport a ſquare frame. In the ſpace between the cylinder and the frame, they fixed four other thick ropes, which they twiſted as many times round the tree as there were revolutions to be made by the flyers. Theſe ropes were drawn through four holes, made in the middle of the four planks of which the frame conſiſted. The four principal flyers diſguiſed like eagles, herons, and other birds, mounted the tree with great agility, by means of a rope which was laced about it from the ground up to the frame; from the frame they mounted one at a time ſucceſſively upon the cylinder, and after having danced there a little, they tied themſelves round with the ends of the ropes, which were drawn through the holes of the frame, and launching with a ſpring from it, began their flight with their wings expanded. The action of their bodies put the frame and the cylinder in motion; the frame by its revolutions gradually untwiſted the cords by which the flyers ſwung; ſo that as the ropes lengthened, they made ſo much the greater circles in their flight. Whilſt theſe four were flying, a fifth danced upon the cylinder, beating a little drum, or waving a flag, without the ſmalleſt apprehenſion of the danger he was in of being precipitated from ſuch a height. The others who were upon the frame (there having been 10 or 12 perſons generally who mounted), as ſoon as they ſaw the flyers in their laſt revolution, precipitated themſelves by the ſame ropes, in order to reach the ground at the ſame time amidſt the acclamations of the populace. Thoſe who precipitated themſelves in this manner by the ropes, that they might make a ſtill greater diſplay of their agility, frequently paſſed from one rope to another, at that part where, on account of the little diſtance between them, it was poſſible for them to do ſo. The moſt eſſential point of this performance conſiſted in proportioning ſo juſtly the height of the tree with the length of the ropes, that the flyers ſhould reach the ground with 13 revolutions, to repreſent by ſuch number their century of 52 years, compoſed in the manner we have already mentioned. This celebrated diverſion is ſtill in uſe in that kingdom; but no particular attention is paid to the number of the revolutions or the flyers; as the frame is commonly ſexagonal or octagonal, and the flyers 6 or 8 in number. In ſome places they put a rail round the frame, to prevent accidents which were frequent after the conqueſt; as the Indians became much given to drinking, and uſed to mount the tree when intoxicated with wine or brandy, and were unable to keep their ſtation on ſo great a height, which was uſually 60 feet." See Plate CXCVI.

FLYING, the progreſſive motion of a bird, or other winged animal, in the air.

The parts of birds chiefly concerned in flying are the wings and tail: by the firſt, the bird ſuſtains and wafts himſelf along: and by the ſecond, he is aſſiſted in aſcending and deſcending, to keep his body poiſed and upright, and to obviate the vacillations thereof.

It is by the largeneſs and ſtrength of the pectoral muſcles, that birds are ſo well diſpoſed for quick, ſtrong, and continued flying. Theſe muſcles, which in men are ſcarce a 70th part of the muſcles of the body in birds, exceed and outweigh all the other muſcles taken together; upon which Mr Willoughby makes this reflection, that if it be poſſible for man to fly, his wings muſt be ſo contrived and adapted, that he may make uſe of his legs, and not his arms, in managing them.

The tail, Meſſrs Willoughby, Ray, and many others, imagine to be principally employed in ſteering and turning the body in the air, as a rudder; but Borelli has put it beyond all doubt, that this is the leaſt uſe of it, which is chiefly to aſſiſt the bird in its aſcent and deſcent in the air, and to obviate the vacillations of the body and wings: for, as to turning to this or that ſide, it is performed by the wings and inclination of the body, and but very little by the help of the tail. The flying of a bird, in effect, is quite a different thing from the rowing of a veſſel. Birds do not vibrate their wings towards the tail, as oars are ſtruck towards the ſtern, but waft them downwards; nor does the tail of the bird cut the air at right angles, as the rudder does the water; but is diſpoſed horizontally, and preſerves the ſame ſituation what way ſoever the bird turns. In effect, as a veſſel is turned about on its centre of gravity to the right, by a briſk application of the oars to the left; ſo a bird, in beating the air with its right wing alone, towards the tail, will turn its fore-part to the left. Thus pigeons changing their courſe to the left, would labour it with their right wing, keeping the other almoſt at reſt. Birds of a long neck alter their courſe by the inclination of their head and neck; which altering the courſe of gravity, the bird will proceed in a new direction.

The manner of FLYING *is thus:* The bird firſt bends his legs, and ſprings with a violent leap from the ground; then opens and expands the joints of his wings, ſo as to make a right line perpendicular to the ſides of his body: thus the wings, with all the feathers therein, conſtitute one continued lamina. Being now raiſed a little above the horizon, and vibrating the wings with great force and velocity perpendicularly againſt the ſubject air, that fluid reſiſts thoſe ſuccuſſions, both from its natural inactivity and elaſticity, by means of which the whole body of the bird is protruded. The reſiſtance the air makes to the withdrawing of the wings, and conſequently the progreſs of the bird, will be ſo much the greater, as the waft or ſtroke of the fan of the wing is longer: but as the force of the wing is continually diminiſhed by this reſiſtance, when the two forces continue to be in *equilibrio*, the bird will remain ſuſpended in the ſame place; for the bird only aſcends ſo long as the arch of air the wing deſcribes makes a reſiſtance equal to the exceſs of the ſpecific gravity of the bird above the air. If the air, therefore be ſo rare as to give way with the ſame velocity as it is ſtruck withal, there will be no reſiſtance, and conſequently the bird can never mount. Birds never fly upwards in a perpendicular line, but always in a parabola. In a direct aſcent, the natural and artificial tendency would oppoſe and deſtroy each other, ſo that the progreſs would be very ſlow. In a direct deſcent they would aid one another, ſo that the fall would be too precipitate.

Artificial FLYING, that attempted by men, by the aſſiſtance of mechanics.

The art of flying has been attempted by ſeveral perſons in all ages. The Leucadians, out of ſuperſtition, are reported to have had a cuſtom of precipitating a man from a high cliff into the ſea, firſt fixing feathers, variouſly expanded, round his body, in order to break the fall.

Friar Bacon, who lived near 500 years ago, not only affirms the art of flying poſſible, but aſſures us, that he himſelf knew how to make an engine wherein a man ſitting might be able to convey himſelf through the air like a bird; and further adds, that there was then one who had tried it with ſucceſs. The ſecret conſiſted in a couple of large thin hollow copper-globes, exhauſted of air; which being much lighter than air, would ſuſtain a chair whereon a perſon might ſit. Fa. Franciſco Lana, in his *Prodr mo*, propoſes the ſame thing, as his own thought. He computes, that a round veſſel of plate-braſs, 14 feet in diameter, weighing three ounces the ſquare foot, will only weigh 1848 ounces; whereas a quantity of air of the ſame bulk will weigh $2155\frac{1}{2}$d ounces; ſo that the globe will not only be ſuſtained in the air, but will carry with it a weight of $373\frac{2}{3}$d ounces, and by increaſing the bulk of the globe, without increaſing the thickneſs of the metal, he adds, that a veſſel might be made to carry a much greater weight.—But the fallacy is obvious: a globe of the dimenſions he deſcribes, Dr Hook ſhows, would not ſuſtain the preſſure of the air, but be cruſhed inwards. Beſides, in whatever ratio the bulk of the globe were increaſed, in the ſame muſt be the thickneſs of the metal, and conſequently the weight be increaſed: ſo that there would be no advantage in ſuch augmentation. See AEROSTATION.

The ſame author deſcribes an engine for flying, invented by the Sieur Beſnier, a ſmith of Sable, in the county of Main. *Vid. Philoſoph. Collect.* N° I.

The philoſophers of king Charles the Second's reign were mightily buſied about this art. The famous biſhop Wilkins was ſo confident of ſucceſs in it, that he ſays, he does not queſtion but in future ages it will be as uſual to hear a man call for his wings, when he is going a journey, as it is now to call for his boots.

FLYING-Bridge. See BRIDGE.

FLYING-Fiſh, a name given by the Engliſh writers to ſeveral ſpecies of fiſh, which by means of their long fins, have a method of keeping themſelves out of water a conſiderable time. See EXOCOETUS.

FLYING-Pinion, is a part of a clock, having a fly or fan whereby to gather air, and ſo bridle the rapidity of the clock's motion, when the weight deſcends in the ſtriking part.

FO, or FOE; an idol of the Chineſe. He was originally worſhipped in the Indies, and tranſported from thence into China, together with the fables with which the Indian books were filled. He is ſaid to have performed moſt wonderful things, which the Chineſe have deſcribed in ſeveral volumes, and repreſented by cuts.

Sect of Fo. See CHINA, n° 103.

Fo Kien. See FOKIEN.

FOAL, or *COLT* and *FILLY*; the young of the horſe kind. The word *colt*, among dealers, is underſtood of the male, as *filly* is of the female. See COLT.

FOCUS, in geometry and conic ſections, is applied to certain points in the parabola, ellipſis, and hyperbola, where the rays reflected from all parts of theſe curves concur and meet. See *CONIC Sections*.

FOCUS, in optics; a point in which any number of rays, after being reflected or refracted, meet.

FODDER, any kind of meat for horſes or other cattle. In ſome places hay and ſtraw, mingled together, is peculiarly denominated *fodder*.

FODDER, in the civil law, is uſed for a prerogative that the prince has, to be provided of corn and other meats for his horſes, by the ſubjects, in his warlike expeditions.

FODDER, in mining, a meaſure containing 22 hundred and an half weight, though in London but 20 hundred weight.

FOENUGREEK, in botany. See TRIGONELLA.

FOENUS NAUTICUM. Where money is lent to a merchant, to be employed in a beneficial trade with condition to be repaid, with extraordinary intereſt, in caſe ſuch voyage was ſafely performed, the agreement was ſometimes called *fœnus nauticum*, ſometimes *uſura maritima*. But as this gave an opening for uſurious and gaming contracts, 19 Geo. II. c. 37. enacts, that all money lent on bottomry, or at *reſpondentia*, on veſſels bound to or from the Eaſt-Indies, ſhall be expreſsly lent only upon the ſhip or merchandiſe: the lender to have the benefit of ſalvage, &c. *Blackſt. Com.* II. 459. *Mol. de Jur. Mar.* 361.

FOESIUS (Anutius), a very learned and celebrated phyſician of the faculty of Paris, born at Mentz in 1528. He tranſlated into Latin the whole works of Hippocrates, judiciouſly correcting the Greek text as he went along; and compoſed a kind of dictionary to him, intitled, *Oeconomia Hippocratis*. He tranſlated, beſide, the Commentaries of Galen upon the ſecond book of Hippocrates; and was the author of ſome other works. After practiſing phyſic a long time with great ſucceſs and reputation, at Lorrain and other places, he died in 1596.

FOETOR, in medicine, ſtinking or fetid effluvia ariſing from the body or any part thereof.

FOETUS, the young of all viviparous animals whilſt in the womb, and of oviparous animals before being hatched: the name is transferred by botaniſts to the *embryos of vegetables*.

Strictly, the name is applied to the young after it is perfectly formed: till which time it is more properly called Embryo. See Anatomy, n° 109, 110.

In the human fœtus are ſeveral peculiarities not to be found in the adult; ſome of them are as follows. 1. The arteries of the navel-ſtring, which are continuations of the hypogaſtics, are, after the birth, ſhrivelled up, and form the ligamenta umbilic. infer. 2. The veins of the navel-ſtring are formed by the union of all the venous branches in the placenta, and paſſing into the abdomen become the falciform ligament of the liver. 3. The lungs, before being inflated with air, are compact and heavy, but after one inſpiration they become light, and as it were ſpongy: and it may be noted here, that the notion of the lungs ſinking in water before the child breathes, and of their ſwimming after the reception of air, are no certain proofs that the child had or had not breathed, much leſs that it was murdered: for the uninflated lungs become ſpecifically lighter than water as ſoon as any degree of putrefaction takes place in them; and this ſoon happens after the death of the child; beſides, where the utmoſt care hath been taken to preſerve the child it hath breathed once or twice, and then died. 4. The thymus gland is very large in the fœtus, but dwindles away in proportion as years advance. 5. The foramen ovale in the heart of a fœtus, is generally cloſed in an adult.

FOG, or Mist, a meteor, conſiſting of groſs vapours, floating near the ſurface of the earth.

Miſts, according to lord Bacon, are imperfect condenſations of the air conſiſting of a large proportion of the air, and a ſmall one of the aqueous vapour: and theſe happen in the winter, about the change of the weather from froſt to thaw, or from thaw to froſt; but in the ſummer, and in the ſpring, from the expanſion of the dew.

If the vapours, which are raiſed plentifully from the earth and waters, either by the ſolar or ſubterraneous heat, do at their firſt entrance into the atmoſphere meet with cold enough to condenſe them to a conſiderable degree, their ſpecific gravity is by that means increaſed, and ſo they will be ſtopped from aſcending; and either return back in form of dew or of drizzling rain, or remain ſuſpended for ſome time in form of a fog. Vapours may be ſeen on the high grounds as well as the low, but more eſpecially about marſhy places. They are eaſily diſſipated by the wind, as alſo by the heat of the ſun. They continue longeſt in the loweſt grounds, becauſe theſe places contain moſt moiſture, and are leaſt expoſed to the action of the wind.

Hence we may eaſily conceive, that fogs are only low clouds, or clouds in the loweſt region of the air; as clouds are no other than fogs raiſed on high. See Cloud.

When fogs ſtink, then the vapours are mixed with ſulphureous exhalations, which ſmell ſo. Objects viewed through fogs appear larger and more remote than through the common air. Mr Boyle obſerves, that upon the coaſt of Coromandel, and moſt maritime parts of the Eaſt-Indies, there are, notwithſtanding the heat of the climate, annual fogs ſo thick, as to occaſion people of other nations who reſide there, and even the more tender ſort of the natives, to keep their houſes cloſe ſhut up.

Fogs are commonly pretty ſtrongly electrified, as appears from Mr Cavallo's obſervations upon them. See Electricity, n° 76.

FOGAGE, in the foreſt law, is rank graſs not eaten up in ſummer.

FOGLIETA, (Oberto or Hubert), a Genoeſe prieſt, and one of the moſt learned writers of the 16th century. He had a ſhare in the diſturbances that were raiſed at Genoa, for which he was baniſhed; and died at Rome in 1581, aged 63. He wrote a hiſtory of Genoa in Italian, which is highly eſteemed; and many works in Latin.

FOGO, or Fuego. See Fuego,

FOHI. See Fe; and China, n° 7.

FOIBLE, a French term, frequently uſed alſo in our language. It literally ſignifies *weak*; and in that ſenſe is applied to the body of animals and the parts thereof, as *foible* reins, *foible* ſight, &c. being derived from the Italian *fievole*, of the Latin *flebilis*, to be "lamented, pitied."

But it is chiefly uſed with us ſubſtantively, to denote a defect or flaw in any perſon or thing. Thus we ſay, every perſon has his foible; and the great ſecret conſiſts in hiding it artfully: Princes are gained by flattery, that is their foible: The foible of young people is pleaſure; the foible of old men is avarice; the foible of the great and learned is vanity; the foible of women and girls, coquetry, or an affectation of having gallants: You ſhould know the forty and the foible of a man before you employ him: We ſhould not let people perceive that we know their foible.

FOIL, in fencing, denotes a blunt ſword, or one that has a button at the end covered with leather, uſed in learning the art of fencing.

Foil, among glaſs-grinders, a ſheet of tin, with quickſilver, or the like, laid on the backſide of a looking-glaſs, to make it reflect. See Foliating.

Foil, among jewellers, a thin leaf of metal placed under a precious ſtone, in order to make it look tranſparent, and give it an agreeable different colour, either deep or pale: thus, if you want a ſtone to be of a pale colour, put a foil of that colour under it; or if you would have it deep, lay a dark one under it.

Theſe foils are made either of copper, gold, or gold and ſilver together. The copper foils are commonly known by the name of *Nuremberg* or *German foils;* and are prepared as follows: Procure the thinneſt copper-plates you can get: beat theſe plates gently upon a well-poliſhed anvil, with a poliſhed hammer, as thin as poſſible; and placing them between two iron-plates as thin as writing-paper, heat them in the fire; then boil the foil in a pipkin, with equal quantities of tartar, and ſalt, conſtantly ſtirring them till by boiling they become white; after which, taking them out and drying them, give them another hammering, till they are made fit for your purpoſe: however care muſt be taken not to give the foils to much heat, for fear of melting; nor muſt they be too long boiled, for fear of attracting too much ſalt.

The manner of poliſhing theſe foils is as follows: Take a plate of the beſt copper, one foot long and about five or ſix inches wide, poliſhed to the greateſt perfection; bend this to a long convex, faſten it upon a half roll, and fix it to a bench or table; then take ſome chalk, waſhed as clean as poſſible, and filtred through a fine linen cloth, till it be as fine as you can make it; and having laid ſome thereof on the roll, and wetted the copper all over, lay your foils on it, and with a poliſhing ſtone and the chalk poliſh your foils till they are as bright as a looking-glaſs; after which they muſt be dried, and laid up ſecure from duſt.

FOKIEN, a province of China in Aſia, commodiouſly ſituated for navagation and commerce, part of it bordering on the ſea, in which they catch large quantities of fiſh, which they ſend ſalted to other parts of the empire. Its ſhores are very uneven, by reaſon of the number and variety of its bays; and there are many forts built thereon to guard the coaſt. The air is hot, but pure and wholeſome.

The mountains are almoſt every where diſpoſed into a kind of amphitheatres, by the labour of the inhabitants, with terraces placed one above another. The fields are watered with rivers and ſprings, which iſſue out of the mountains, and which the huſbandmen conduct in ſuch a manner as to overflow the fields of rice when they pleaſe, becauſe it thrives beſt in watery ground. They make uſe of pipes of bambo for this purpoſe.

They have all commodities in common with the reſt of China; but more particularly muſk, precious ſtones, quickſilver, ſilk, hempen cloth, calico, iron, and all ſorts of utenſils, wrought to the greateſt perfection. From other countries they have cloves, cinnamon, pepper, ſandal-wood, amber, coral, and many other things. The capital city is Foutcheou Fou; or, as others would have it written, Fucherofu. But as for Fokien, which moſt geographers make the capital, Groſier informs us there is no ſuch place.

FOLARD (Charles), an eminent Frenchman, famous for his ſkill and knowledge in the art military, was born at Avignon in 1669, of a noble family, but not a rich one. He diſcovered an early turn for the ſciences, and a ſtrong paſſion for arms; which laſt was ſo inflamed by reading Cæſar's Commentaries, that he inliſted at 16 years of age. His father got him off, and ſhut him in a monaſtery: but he made his eſcape in about two years after, and entered himſelf a ſecond time in quality of cadet. His inclination for military affairs, and the great pains he took to accompliſh himſelf in that way, recommended him to notice; and he was admitted into the friendſhip of the firſt-rate officers. M. de Vendome, who commanded in Italy in 1720, made him his aid-de-camp, having conceived the higheſt regard for him; and ſoon after ſent him with part of his forces into Lombardy. He was entirely truſted by the commander of that army; and no meaſures were concerted, or ſteps taken, without conſulting him. By purſuing his plans, many places were taken, and advantages gained; and ſuch, in ſhort, were his ſervices, that he had a penſion of 400 livres ſettled upon him, and was honoured with the croſs of St Lewis. He diſtinguiſhed himſelf greatly Auguſt 15, 1705, at the battle of Caſſano; where he received a wound upon his left hand, which deprived him of the uſe of it ever after. It was at this battle that he conceived the firſt idea of that ſyſtem of columns, which he afterwards prefixed to his Commentaries upon Polybius. The duke of Orleans ſending de Vendome again into Italy in 1706, Folard had orders to throw himſelf into Modena to defend it againſt Eugene: where, tho' he acquitted himſelf with his uſual ſkill, he was very near being aſſaſſinated. The deſcription which he has given of the conduct and character of the governor of this town, may be found in his Treatiſe of the Defence of Places, and deſerves to be read. He received a dangerous wound on the thigh at the battle of Malplaquet, and was ſome time after made priſoner by prince Eugene. Being exchanged in 1711, he was made governor of Bourbourg. In 1714 he went to Malta, to aſſiſt in defending that iſland againſt the Turks. Upon his return to France, he embarked for Sweden, having a paſſionate deſire to ſee Charles XII. He acquired the eſteem and confidence of that famous general, who ſent him to France to negociate the re-eſtabliſhment of James II. upon the throne of England; but that project being dropped, he returned to Sweden, followed Charles XII. in his expedition to Norway, and ſerved under him at the ſiege of Frederickſhall, where that prince was killed, Dec. 11, 1718. Folard then returned to France; and made his laſt campaign in 1719, under the duke of Berwick, in quality of colonel. From that time he applied himſelf intenſely to the ſtudy of the art military as far as it could be ſtudied at home; and built his theories upon the foundation of his experience and obſervations on facts. He contracted an intimacy with count Saxe, who, as he then declared, would one day prove a very great general. He was choſen a fellow of the Royal Society at London in 1749; and, in 1751, made a journey to Avignon, where he died in 1752, aged 83 years. He was the author of ſeveral works, the principal of which are, 1. Commentaries upon Polybius, in ſix volumes, 4to. 2. A Book of new Diſcoveries in War. 3. A Treatiſe concerning the Defence of Places, &c. in French. Thoſe who would know more of this eminent ſoldier, may conſult a French piece, intitled, *Memoirs pour ſervir a l'Hiſtoire de M. de Chevalier de Folard. Ratiſbone*, 1753, 12mo.

FOLC-Lands, (Sax.) copy-hold lands ſo called in the time of the Saxons, as charter-lands were called *boc-lands*, Kitch. 173. *Folkland* was *terra vulgi* or *popularis*; the land of the vulgar people, who had no certain eſtate therein, but held the ſame, under the rents and ſervices accuſtomed or agreed, at the will only of their lord the thane; and it was therefore not put in writing, but accounted *prædium ruſticum et ignobile*. Spelm. of Feuds, *c*. 5.

FOFLCMOTE, or Folkmote, (Sax. *Folcgemot*, i. e. *conventus populi*), is compounded of *folk populus*, and *mote*, or *gemote convenire*; and ſignified originally, as Somner in his Saxon Dictionary informs us, a general aſſembly of the people, to conſider of and order matters of the commonwealth. And Sir Henry Spelman ſays, the *folcmote* was a ſort of annual parliament, or convention of the biſhops, thanes, aldermen, and freemen, upon every May-day yearly; where the laymen were ſworn to defend one another and the king, and to preſerve the laws of the kingdom; and then conſulted of the common ſafety. But Dr Brady infers from the laws of the Saxon kings of England, that it was an inferior court, held before the king's *reeve* or ſteward, every month, to do *folk* right, or compoſe ſmaller differences, from whence there lay appeal to the ſuperior courts; *Gloſs*. p. 48. Squire ſeems to think the *folcmote* not diſtinct from the *ſhiremote*, or common general meeting of the county. See his *Angl. Sax. Gov*. 155. *n*.

Manwood mentions *folcmote* as a court holden in London, wherein all the *folk* and people of the city did complain of the mayor and aldermen, for miſgovernment within the ſaid city; and this word is ſtill in uſe among the Londoners, and denotes *celebrem ex tota civitate conventum*. *Stow's Survey*. According to Kennet, the *folcmote* was a common-council of all the inhabitants of a city, town, or borough, convened often by ſound of bell, to the *Mote Hall*, or *Houſe*; or it was applied to a larger congreſs of all the freemen within a county, called the *ſhire-mote*, where formerly all knights and military tenants did fealty to the king, and elected the annual ſheriff on the 1ſt of October; till this popular election, to avoid tumults and riots, devolved to the king's nomination, anno 1315, 3 Edw. I. After which the city *folkmote* was ſwallowed up in a ſelect committee or common-council, and the country *folkmote* in the ſheriff's tourn and aſſiſes.

The word *folkmote* was alſo uſed for any kind of popular or public meeting; as of all the tenants at the *court-leet*, or *court-baron*, in which ſignification it was of a leſs extent. *Paroch. Antiq*. 120.

FOLENGIO (Theophilus), of Mantua, known alſo by the title of *Merlin Coccaye*, an Italian poet, remarkable for giving to a poem a name which has been adopted ever ſince for all trifling performances of the ſame ſpecies, conſiſting of buffoonry, puns, anagrams, wit without wiſdom, and humour without good-ſenſe. His poem was called *The Macaroni*, from an Italian cake of the ſame name, which is ſweet to the taſte, but has not the leaſt alimentary virtue, on the contrary palls the appetite and cloys the ſtomach. Theſe idle poems, however, became the reigning taſte in Italy and in France: they gave birth to macaroni academies; and, reaching England, to macaroni clubs: till, in the end, every thing inſipid, contemptible, and ridiculous, in the character, dreſs, or behaviour, of both men and women, is now ſumed up in the deſpicable appellation of *a macaroni*. Folengio died in 1544.

FOLIA, among botaniſts, particularly ſignify the leaves of plants; thoſe of flowers being expreſſed by the word *petals*. See Leaf.

FOLIAGE, a cluſter or aſſemblage of flowers, leaves, branches, &c.

Foliage, is particularly uſed for the repreſentations of ſuch flowers, leaves, branches, rinds, &c. whether natural or artificial, as are uſed for enrichments on capitals, friezes, pediments, &c.

FOLIATING *of* Looking-glases, the ſpreading the plates over, after they are poliſhed, with quickſilver, &c. in order to reflect the image. It is performed thus: A thin blotting paper is ſpread on the table, and ſprinkled with fine chalk; and then a fine lamina or leaf of tin, called *foil*, is laid over the paper; upon this is poured mercury, which is to be diſtributed equally over the leaf with a hare's-foot or cotton: over this is laid a clean paper, and over that the glaſs-plate, which is preſſed down with the right-hand, and the paper drawn gently out with the left: this being done, the plate is covered with a thicker paper, and loaded with a greater weight that the ſuperfluous mercury may be driven out and the tin adhere more cloſely to the glaſs. When it is dried, the weight is removed, and looking-glaſs is complete.

Some add an ounce of marcaſite, melted by the fire; and, leſt the mercury ſhould evaporate in ſmoke, they pour it into cold water; and when cooled, ſqueeze through a cloth, or through leather.

Some add a quarter of an ounce of tin and lead to the marcaſite, that the glaſs may dry the ſooner.

Foliating *of Globe Looking-glaſſes*, is done as follows: Take five ounces of quickſilver and one ounce of biſmuth; of lead and tin, half an ounce each: firſt put the lead and tin into fuſion, then put in the biſmuth; and when you perceive that in fuſion too, let it ſtand till it is almoſt cold, and pour the quickſilver into it: after this, take the glaſs-globe, which muſt be very clean, and the inſide free from duſt: make a paper-funnel, which put into the hole of the globe, as near the glaſs as you can, ſo that the amalgam, when you pour it in, may not ſplaſh, and cauſe the glaſs to be full of ſpots; pour it in gently, and move it about, ſo that the amalgam may touch every where: if you find the amalgam begin to be curdly and fixed, then hold it over a gentle fire, and it will eaſily flow again; and if you find the amalgam too thin, add a little more lead, tin, and biſmuth to it. The finer and clearer your globe is, the better will the looking-glaſs be.

Dr Shaw obſerves, that this operation has conſiderable advantages, as being performable in the cold; and that it is not attended with the danger of poiſonous fumes from arſenic, or other unwholſome matters, uſually employed for this purpoſe: beſides, how far it is applicable to the more commodious foliating of the common looking glaſſes, and other ſpeculums, he thinks, may deſerve to be conſidered.

FOLIO, in merchants books, denotes a page, or rather both the right and left hand pages, theſe being ex-

expreſſed by the ſame figure, and correſponding to each other. See Book-keeping.

Folio, among printers and bookſellers, the largeſt form of books, when each ſheet is ſo printed that it may be bound up in two leaves only.

FOLIS. See Follis.

FOLIUM, or Leaf, in botany. See Leaf.

FOLKES (Martin), an Engliſh antiquary, mathematician, and philoſopher, was born at Weſtminſter about 1690; and was greatly diſtinguiſhed as a member of the Royal Society in London, and of the Academy of Sciences at Paris. He was admitted into the former at 24 years of age; made one of their council two years after; named by Sir Iſaac Newton himſelf as vice-preſident; and, after Sir Hans Sloane, became preſident. There are numerous Memoirs of his in the Philoſophical Tranſactions. Coins, ancient and modern, were a great object with him; and his laſt production was a book upon the Engliſh Silver Coin, from the conqueſt to his own times. He died at London in 1754. Dr Birch had drawn up materials for a life of Mr Folkes, which are preſerved at large in the Anecdotes of Bowyer, p.562. *et ſeq.*

FOLKESTONE, a town of Kent, between Dover and Hythe, 72 miles from London, appears to have been a very ancient place, from the Roman coins and Britiſh bricks often found in it. Stillingfleet and Tanner take it for the *Lapis Tituli* of Nennius. It was burnt by Earl Godwin, and by the French in the reign of Edward III. It had five churches, now reduced to one. It is a member of the town and port of Dover; and has a weekly market and an annual fair. It is chiefly noted for the multitude of fiſhing-boats that belong to its harbour, which are employed in the ſeaſon in catching mackerel for London; to which they are carried by the mackerel-boats of London and Barking. About Michaelmas, the Folkeſtone-barks, with others from Suſſex, go away to the Suffolk and Norffolk coaſts, to catch herrings for the merchants of Yarmouth and Leoſtoff.—Folkeſtone gives title of *Viſcount* to William Henry Bouverie, whoſe grandfather, Jacob, was ſo created in 1747. It has been obſerved of ſome hills in this neighbourhood, that they have viſibly ſunk and grown lower within memory.

FOLKLAND, and Folkmote. See Folcland.

FOLLICULUS, (from *follis*, "a bag,") a ſpecies of ſeed-veſſel firſt mentioned by Linnæus in his *Delineatio plantæ*, generally conſiſting of one valve, which opens from bottom to top on one ſide, and has no ſuture for faſtening or attaching the ſeeds within it.

FOLLICULI are likewiſe defined by the ſame author to be ſmall glandular veſſels diſtended with air, which appear on the ſurface of ſome plants; as at the root of water-milfoil, and on the leaves of aldrovanda. In the former, the veſſels in queſtion are roundiſh, and furniſhed with an appearance like two horns; in the latter, pot-ſhaped, and ſemicircular.

FOLLIS, or Folis, anciently ſignified a little bag or purſe; whence it came to be uſed for a ſum of money, and very different ſums were called by that name: thus the ſcholiaſt on the Baſilics, mentions a follis of copper which was worth but the 24th part of the miliarenſis; the gloſſæ nomicæ, quoted by Gronovius and others, one of 125 miliarenſis, and another of 250 denarii, which was the ancient ſeſtertium; and three different ſums of eight, four, and two pounds of gold, were each called *follis*. According to the account of the ſcholiaſt, the ounce of ſilver, which contained 5 miliarenſis of 60 in the pound, was worth 120 follis of copper. The gloſſographer, deſcribing a follis of 250 denarii, ſays it was equal to 312 pounds 6 ounces of copper; and as the denarius of that age was the 8th part of an ounce, an ounce of ſilver muſt have been worth 120 ounces of copper; and therefore the ſcholiaſt's follis was an ounce of copper, and equal to the gloſſographer's nummus. But as Conſtantine's copper money weighed a quarter of a Roman ounce, the ſcholiaſt's follis and the gloſſographer's nummus contained four of them, as the ancient nummus contained four aſſes.

FOLLY, according to Mr Locke, conſiſts in the drawing of falſe concluſions from juſt principles; by which it is diſtinguiſhed from madneſs, which draws juſt concluſions from falſe principles.

But this ſeems too confined a definition; *folly*, in its moſt general acceptation, denoting a weakneſs of intellect or apprehenſion, or ſome partial abſurdity in ſentiment or conduct.

FOMAHANT, in aſtronomy, a ſtar of the firſt magnitude in the conſtellation Aquarius.

FOMENTATION, in medicine, is a fluid externally applied, uſually as warm as the patient can bear it, and in the following manner. Two flanel cloths are dipped into the heated liquor, one of which is wrung as dry as the neceſſary ſpeed will admit, then immediately applied to the part affected; it lies on until the heat begins to go off, and the other is in readineſs to apply at the inſtant in which the firſt is removed: thus theſe flanels are alternately applied, ſo as to keep the affected part conſtantly ſupplied with them warm. This is continued 15 or 20 minutes, and repeated two or three times a-day.

Every intention of relaxing and ſoothing by fomentations may be anſwered as well by warm water alone as when the whole tribe of emollients are boiled in it; but when diſcutients or antiſeptics are required, ſuch ingredients muſt be called in as are adapted to that end.

The degree of heat ſhould never exceed that of producing a pleaſing ſenſation; great heat produces effects very oppoſite to that intended by the uſe of fomentations.

FONG-yang, a city of China, in the province of Kiang-*Nan*. It is ſituated on a mountain, which hangs over the yellow river, and incloſes with its walls ſeveral fertile little hills. Its juriſdiction is very extenſive: for it comprehends 18 cities; 5 of which are of the ſecond, and 13 of the third claſs. As this was the birth-place of the emperor Hong-vou, chief of the preceding dynaſty, this prince formed a deſign of rendering it a famous and magnificent city, in order to make it the ſeat of empire. After having expelled the weſtern Tartars, who had taken poſſeſſion of China, he transferred his court hither, and named the city *Fong-yang*; that is to ſay, "The Place of the Eagle's Splendor." His intention, as we have ſaid, was to beautify and enlarge it; but the inequality of the ground, the ſcarcity of freſh water, and above all the vicinity of his father's tomb, made him change his deſign. By the unanimous advice of his principal officers, this prince eſtabliſhed his court at NAN-KING, a more beautiful and commodious place. When he had formed this reſolution, a ſtop was put to the intended works: the imperial palace which was to have been incloſed by a triple wall, the walls of the city to which a circumference of nine leagues were aſſigned, and the canals that were begun, all were abandoned; and nothing was finiſhed but three monuments; which ſtill remain. The extent and magnificence of theſe ſufficiently ſhow what the beauty of this city would have been had the emperor purſued his original deſign. The firſt is the tomb of the father of Hong-vou, to decorate which no expence was ſpared; it is called *Hoan-lin*, or the *Royal Tomb*. The ſecond is a tower built in the middle of the city, which is of an oblong form, and 100 feet high. The third is a magnificent temple erected to the god Fo. At firſt it was only a pagod, to which Hong-vou retired after having loſt his parents, and where he was admitted as an inferior domeſtic; but, having ſoon become weary of this kind of life, he enliſted with the chief of a band of banditti, who had revolted from the Tartars. As he was bold and enterpriſing, the general made choice of him for his ſon-in-law; ſoon after he was declared his ſucceſſor by the unanimous voice of the troops. The new chief, ſeeing himſelf at the head of a large party, had the preſumption to carry his views to the throne. The Tartars, informed of the progreſs of his arms, ſent a numerous army into the field: but he ſurpriſed and attacked them with ſo much impetuoſity, that they were obliged to fly; and though they ſeveral times returned to the charge, they were ſtill defeated, and at length driven entirely out of China. As ſoon as he mounted the throne, he cauſed the ſuperb temple which we have mentioned to be raiſed out of gratitude to the Bonzes, who had received him in his diſtreſs, and aſſigned them a revenue ſufficient for the maintenance of 300 perſons, under a chief of their own ſect, whom he conſtituted a mandarin, with power of governing them, independent of the officers of the city. This pagod was ſupported as long as the preceding dynaſty laſted; but that of the eaſtern Tartars, which ſucceeded, ſuffered it to fall to ruin.

FONG-Choui, the name of a ridiculous ſuperſtition among the Chineſe. See CHINA, nº 105.

FONT, among eccleſiaſtical writers, a large baſon, in which water is kept for the baptiſing of infants or other perſons.

FONT, in the art of printing, denotes a complete aſſortment of letters, accents, &c. uſed in printing. See FOUNT.

FONTAINE (John), the celebrated French poet, and one of the firſt rate geniuſes of his age, was born at Chateau Thierri in Champaigne, the 8th of July 1621, of a good extraction. At the age of 19 he entered amongſt the Oratorians, but quitted that order 18 months after. He was 22 years of age before he knew his own talents for poetry; but hearing an ode of Malherbe read, upon the aſſaſſination of Henry IV. he was ſo taken with admiration of it, that the poetical fire, which had before lain dormant within him, ſeemed to be enkindled from that of the other great poet. He applied himſelf to read, to meditate, to repeat, in fine, to imitate, the works of Malherbe. The firſt eſſays of his pen he confined to one of his relations, who made him read the beſt Latin authors, Horace, Virgil, Terence, Quintilian, &c. and then the beſt compoſitions in French and Italian. He applied himſelf likewiſe to the ſtudy of the Greek authors, particularly Plato and Plutarch. Some time afterwards his parents made him marry a daughter of a lieutenant-general, a relation of the great Racine. This young lady, beſides her very great beauty, was remarkable for the delicacy of her wit, and Fontaine never compoſed any work without conſulting her. But as her temper was none of the beſt, to avoid diſſention, he ſeparated himſelf from her company as often as he well could. The famous ducheſs of Bouillon, niece to cardinal Mazarine, being exiled to Chateau Thierri, took particular notice of Fontaine. Upon her recal, he followed her to Paris; where, by the intereſt of one of his relations, he got a penſion ſettled upon him. He met with great friends and protectors amongſt the moſt diſtinguiſhed perſons of the court, but madam de la Sabliere was the moſt particular. She took him to live at her houſe; and it was then that Fontaine, diveſted of domeſtic concerns, led a life conformable to his diſpoſition, and cultivated an acquaintance with all the great men of the age. It was his cuſtom after he was fixed at Paris, to go every year, during the month of September, to his native place of Chateau-Thierri, and pay a viſit to his wife, carrying with him Racine, Deſpreaux, Chappelle, or ſome other celebrated writers. When he has ſometimes gone thither alone by himſelf, he has come away without remembering even to call upon her; but ſeldom omitted ſelling ſome part of his lands, by which means he ſquandered away a conſiderable fortune. After the death of madame de la Sabliere he was invited into England, particularly by madame Marazin, and by St Evremond, who promiſed him all the ſweets and comforts of life; but the difficulty of learning the Engliſh language, and the liberality of the duke of Burgundy, prevented his voyage.

About the end of the year 1692 he fell dangerouſly ill: and as it is cuſtomary upon theſe occaſions in the Romiſh church, he made a general confeſſion of his whole life to P. Poguet, an oratorian, and before he received the ſacrament, he ſent for the gentlemen of the French academy, and in their preſence declared his ſincere compunction for having compoſed his Tales; a work he could not reflect upon without the greateſt repentance and deteſtation; promiſing, that if it ſhould pleaſe God to reſtore his health, he would employ his talents only in writing upon matters of morality or piety. He ſurvived this illneſs two years, living in the moſt exemplary and edifying manner, and died the 13th of March 1695, being 74 years of age. When they ſtripped his body, they found next his ſkin a hair ſhirt; which gave room for the following expreſſion of the younger Racine:

Et l'Auteur de Jacondæ eſt orme d' un Cilice.

Fontaine's character is remarkable for a ſimplicity, candour, and probity, ſeldom to be met with. He was of an obliging diſpoſition; cultivating a real friendſhip with his brother poets and authors; and, what is very rare, beloved and eſteemed by them all. His converſation was neither gay nor brilliant, eſpecially when he was not among his intimate friends. One day being invited to dinner at a farmer-general's, he eat a great deal, but did not ſpeak. Riſing up from table very early, under pretext of going to the academy, one of the company repreſented to him that it was not yet a proper time: "Well (ſays he), if it is not, I will ſtay a little longer." He had one ſon by his wife in the year 1660. At the age of 14, he put him into the hands of M. de Harley, the firſt preſident, recommending to him his education and fortune. It is ſaid that having been a long time without ſeeing him. he happened to meet him one day viſiting, without recollecting him again, and mentioned to the company that he thought that young man had a good deal of wit and underſtanding. When they told him it was his own ſon, he anſwered in the moſt tranquil manner, "Ha! truly I am glad on't." An indifference, or rather an abſence of mind, influenced his whole conduct, and rendered him often inſenſible to the inclemency of the weather. Madame de Bouillon going one morning to Verſailles, ſaw him, abſtracted in thought, ſitting in an arbour; returning at night ſhe found him in the ſame place, and in the ſame attitude, although it was very cold and had rained almoſt the whole day. He carried this ſimplicity ſo far, that he was ſcarce ſenſible of the bad effects ſome of his writings might occaſion, particularly his tales. In a great ſickneſs, his confeſſor exorting him to prayer and alms-deeds: "As for alms-deeds (replied Fontaine), I am not able, having nothing to give; but they are about publiſhing a new addition of my Tales, and the bookſeller owes me a hundred copies; you ſhall have them to ſell, and diſtribute their amount amongſt the poor." Another time P. Poguet exhorting him to repent of his faults, "If he has committed any (cried the nurſe), I am ſure it is more from ignorance than malice, for he has as much ſimplicity as an infant." One time having compoſed a tale, wherein he made a profane application of theſe words of the Goſpel, "Lord, five talents thou didſt deliver to me," he dedicated, it by a moſt ingenious prologue, to the celebrated Arnauld telling him, it was to ſhow to poſterity the great eſteem he had for the learned doctor. He was not ſenſible of the indecency of the dedication, and the profane application of the text, till Boileau and Racine repreſented it to him. He addreſſed, another, by a dedication in the ſame manner to the archbiſhop of Paris. His Fables are an immortal work, exceeding every thing in that kind, both ancient and modern, in the opinion of the learned. People of taſte, the oftener they read them, will find continually new beauties and charms, not to be met with elſewhere. The deſcendants of this great poet are extemped in France from all taxes and impoſitions, a privilege which the intendants of Soiſſons to this day think it an honour to confirm to them.

FONTAINBLEAU, a town in the Iſle of France, and in the Gatinois, remarkable for its fine palace, which has been the place where the kings of France uſed to lodge when they went a-hunting. It was firſt embelliſhed by Francis I. and all the ſucceſſive kings have added ſomething thereto; inſomuch that it may now be called the fineſt pleaſure-houſe in the world. It ſtands in the midſt of a foreſt, conſiſting of 26,424 arpents of land, each containing 100 ſquare perches, and each perch 18 feet. E. Long. 2. 33. N. Lat. 40. 22.

FONTAINES (Peter Francis), a French critic, was born of a good family at Rouen in 1685. At 15, he entered in to the ſociety of the Jeſuits; and at 30, quitted it, for the ſake of returning to the world. He was a prieſt and had a cure in Normandy; but left it, and was, as a man of wit and letters, ſome time with the cardinal d'Auvergne. Having excited ſome attention at Paris by certain critical productions, the Abbé Bignon in 1724 committed to him the *Journal des Sçavans*. He acquitted himſelf well in the department, and was peaceably enjoying the applauſes of the public, when his enemies, whom by critical ſtrictures in his Journal he had made ſuch, formed an accuſation againſt him of a moſt abominale crime, and procured him to be impriſoned. By the credit of powerful friends, he was ſet at liberty in 15 days: the magiſtrate of the police took upon himſelf the trouble of juſtifying him in aletter to the Abbé Bignon; and this letter having been read amidſt his fellow-labourers in the Journal, he was unanimouſly re-eſtabliſhed in his former credit. This happened in 1725. But with whatever repute he might acquit himſelf in this Journal, frequent diſguſts made him frequently abandon it. He laboured mean while in ſome new periodical works, from which he derived his greateſt fame. In 1731, he began one under the title of *Nouvelliſte du Parnaſſe, ou Reflexions ſur les Ouvrages nouveaux*; but only proceeded to two volumes; the work having been ſuppreſſed by authority, from the inceſſant complaints of authors ridiculed therein. About three years after, in 1735, he obtained a new privilege for a periodical production, intitled, *Obſervations ſur les Ecrits Modernes*: which, after continuing to 33 volumes, was ſuppreſſed again in 1743. Yet the year following, 1744, he publiſhed another weekly paper called, *Judgmens ſur les Ouvrages nouveaux*, and proceeded to 11 volumes: the two laſt being done by other hands. In 1745, he was attacked with a diſorder in the breaſt, which ended in a dropſy that proved fatal in five weeks. "He was (ſays M. Freron) born a ſentimental perſon; a philoſopher in conduct as well as in principle; exempt from ambition; and of a noble firm ſpirit, which would not ſubmit to ſue for preferments or titles. In common converſation he appeared only a common man; but when ſubjects of literature, or any thing out of the ordinary way, were agitated, he diſcovered great force of imagination and wit." Beſides the periodical works mentioned above, he was the author of many others: his biographer gives us no leſs than 17 articles; many of them critical, ſome hiſtorical, and ſome tranſlations from Engliſh writers, chiefly from Pope, Swift, Fielding, &c. The Abbé de la Porte, publiſhed, in 1757, *L'Eſprit de l'Abbé des Fontaines*, in 4 vols 12mo; prefixed to which is the Life of Fontaines, a catalogue of his works, and another catalogue of writings againſt him.

FONTANELLA, in anatomy, imports the quadrangular aperture found betwixt the os frontis and oſſa ſincipitis, in children juſt born; which is alſo called *fons pulſatilis*.

FONTARABIA, a ſea port town of Spain in Biſcay, and in the territory of Guipuſcoa, ſeated on a peninſula on the ſea ſhore, and on the river Bidaſſoa. It is ſmall, but well fortified both by nature and art: and has a good harbour, though dry at low water. It is built in the form of an amphitheatre, on the declivity of an hill, and ſurrounded on the land ſide by the high Pyrenean mountains. It is a very important place, being accounted the key of Spain on that ſide. W. Long. 1. 43. N. Lat. 43. 23.

FONTENAY, (John Baptiſt Blain de), a very famous painter of fruit and flowers, was born at Caen in 1654. Louis XIV. gave him a penſion, and an apartment in the galleries of the Louvre; and he was nominated counſellor of the Academy of Painting. His fruit and flowers have all the freſhneſs and beauty of nature; the very dew ſeems to trickle down their ſtalks, with all the luſtre and tranſparency of the diamond, while the inſects upon them ſeem perfectly alive and animated. This ingenious painter died at Paris in 1715.

FONTENELLE, (Bernard de), a celebrated French author, was born in 1657, and died in 1756, when he was near 100 years old. He diſcharged the truſt of perpetual ſecretary to the Academy of Sciences above 40 years with univerſal applauſe; and his Hiſtory of the Academy of Sciences throws a great light upon their memoirs, which are very obſcure. The eloges which he pronounced on the deceaſed members of the academy, have this peculiar merit, that they excite a reſpect for the ſciences as well as for the author. In his poetical performances, and the Dialogues of the Dead, the ſpirit of Voiture was diſcernible, though more extended and more philoſophical. His Plurality of Worlds, is a work ſingular in its kind; the deſign of which was to preſent that part of philoſophy to view in a gay and pleaſing dreſs. In his moſt advanced years, he publiſhed comedies, which, though they ſhowed the elegance of Fontenelle, were little fitted for the ſtage; and An Apology for Des Cartes's Vortices. M. de Voltaire, who declares him to have been the moſt univerſal genius the age of Louis XIV. produced, ſays, "We muſt excuſe his comedies, on account of his great age; and his Carteſian opinions, as they were thoſe of his youth, when they were univerſally received all over Europe."

FONTENOY, a town or village of the Auſtrian Netherlands, in the province of Hainault, and on the borders of Flanders; remarkable for a battle fought there between the allies and the French on the firſt of May 1745. The French were commanded by Mareſchal Saxe, and the allies by the Duke of Cumberland. The latter behaved with great bravery; but through the ſuperiority of the numbers of the French army, and likewiſe the ſuperior generalſhip of their commander, the allies were defeated with great ſlaughter. The Britiſh troops behaved with aſtoniſhing intrepidity, as their enemies themſelves owned. It is even ſaid, that the battle was loſt through the cowardice of the Dutch, who failed in their attack on the village of Fontenoy, on which the event of the day depended. E. Long. 2. 20. N. Lat. 50. 25.

FONTENOY, a village of France, in the duchy of Burgundy, remarkable for a bloody battle fought there in 841, between the Germans and the French, in which were killed above 100,000 men; and the Germans were defeated. E. Long. 3. 48. N. Lat. 47. 28.

FONTEVRAUD, or FRONTEVAUX (Order of), in eccleſiaſtical hiſtory, a religious order inſtituted by Robert d'Arbriſſel, about the latter end of the 11th century, and taken under the protection of the holy ſee by pope Paſcal II. in 1106, confirmed by a bull in 1113, and inveſted by his ſucceſſors with very extraordinary privileges. The chief this order is a female, who is appointed to inſpect both the monks and nuns. The order is divided into four provinces, which are thoſe of France, Aquitaine, Auvergne, and Bretagne, in each of which they have ſeveral priories.

FONTICULUS, or FONTANELLA, in ſurgery, an iſſue, ſeton, or ſmall ulcer, made in various parts of the body, in order to eliminate the latent corruption out of it.

FONTINALIA, or FONTANALIA, in antiquity, a religious feaſt held among the Romans in honour of the deities who preſided over fountains or ſprings. Varro obſerves, that it was the cuſtom to viſit the wells on thoſe days, and to caſt crowns into fountains. Scaliger, in his conjectures on Varro, takes this not to be a feaſt of fountains in general, as Feſtus inſinuates, but of the fountain which had a temple at Rome, near the Porta Capena, called alſo *Porta Fontinalis*: he adds, that it is of this fountain Cicero ſpeaks in his ſecond book *De legib.* The fontinalia were held on the 13th of October.

FONTINALIS, WATER-MOSS, in botany: A genus of the natural order of muſci, belonging to the cryptogamia claſs of plants. The anthera is hooded; the calyptra, or covering of the anthera, ſeſſile, incloſed in a perichætium or empalement of leaflets different from thoſe of the reſt of the plant. There are four ſpecies, all of them natives of Britain. They grow on the brinks of rivulets, and on the trunks of trees. The moſt remarkable is the antipyretica, with purple ſtalks. The Scandinavians line the inſides of their chimneys with this moſs, to defend them againſt the fire; for contrary to the nature of all other moſs, this is ſcarcely capable of burning.

FOOD, in the moſt extenſive ſignification of the word, implies whatever aliments are taken into the body, whether ſolid or fluid; but, in common language, it is generally uſed to ſignify only the ſolid part of our aliment.

We are told, that in the firſt ages men lived upon acorns, berries, and ſuch fruits as the earth ſpontaneouſly produces; then they proceeded to eat the fleſh of wild animals taken in hunting: But their numbers decreaſing, and mankind multiplying, neceſſity taught them the art of cultivating the ground, to ſow corn, &c. By and by they began to aſſign to each other, by general conſent, portions of land to produce them their ſupply of vegetables; after this, reaſon ſuggeſted the expedient of domeſticating certain animals, both to aſſiſt them in their labours and ſupply them with food. Hogs were the firſt animals of the domeſtic kind that appeared upon their tables; they held it to be ungrateful to devour their beaſts that aſſiſted them in their labours.—When they began to make a free uſe of domeſtic animals, they roaſted them only; boiling was a refinement in cookery which for ages they were ſtrangers to; and fiſh living in an element men were unuſed to, were not eaten till they grew ſomewhat civilized. Menelaus complains, in the Odyſſey, that they had been conſtrained to feed upon them.

The moſt remarkable diſtinction of foods, in a medical view, is into thoſe which are already aſſimilated into the animal nature, and ſuch as are not. Of the firſt kind are animal ſubſtances in general; which if not entirely ſimilar, are nearly ſo, to our nature. The ſecond comprehends vegetables, which are much more difficultly aſſimilated. But as the nouriſhment of all animals, even thoſe which live on other animals, can be traced originally to the vegetable kingdom, it is plain, that the principle of all nouriſhment is in vegetables.

Cullen on the Mat. Med. 1ſt edit.

Though there is perhaps no vegetable which does not afford nouriſhment to ſome ſpecies of animals or other; yet, with regard to mankind, a very conſiderable diſtinction is to be made. Thoſe vegetables which are of a mild, bland, agreeable taſte, are proper nouriſhment; while thoſe of an acrid, bitter, and nauſeous nature, are improper. We uſe, indeed, ſeveral acrid ſubſtances as food; but the mild, the bland, and agreeable, are in the largeſt proportion in almoſt every vegetable. Such as are very acrid, and at the ſame time of an aromatic nature, are not uſed as food, but as ſpices or condiments, which anſwer the purpoſes of medicine rather than any thing elſe. Sometimes, indeed, acrid and bitter vegetables ſeem to be admitted as food. Thus celeri and endive are uſed in common food, though both are ſubſtances of conſiderable acrimony; but it muſt be obſerved, that, when we uſe them, they are previouſly blanched, which almoſt totally deſtroys their acrimony. Or if we employ other acrid ſubſtances, we generally, in a great meaſure, deprive them of their acrimony by boiling. In different countries the ſame plants grow with different degrees of acrimony. Thus, garlic here ſeldom enters our food; but in the ſouthern countries, where the plants grow more mild, they are frequently uſed for that purpoſe. The plant which furniſhes caſſada, being very acrimonious, and even poiſonous, in its recent ſtate, affords an inſtance of the neceſſity of preparing acrid ſubſtances even in the hot countries: and there are other plants, ſuch as arum-root, which are ſo exceedingly acrimonious in their natural ſtate, that they cannot be ſwallowed with ſafety; yet, when deprived of that acrimony, will afford good nouriſhment.

The moſt remarkable properties of different vegetable ſubſtances as food, are taken notice of under their different names; here we ſhall only compare vegetable foods in general with thoſe of the animal kind.

I. *In the Stomach*, they differ remarkably, in that the vegetables always have a tendency to acidity, while animal food of all kinds tend rather to alkaleſcency and putrefaction. Some animal foods, indeed, turn manifeſtly acid before they putrify; and it has been aſſerted, that ſome degree of aceſcency takes place in every kind of animal food before digeſtion. This aceſcency of animal food, however, never comes to any morbid degree, but the diſeaſe is always on the ſide of putreſcency. The aceſcency of vegetables is more frequent, and ought to be more attended to, than the alkaleſcency of animal food; which laſt, even in weak ſtomachs, is ſeldom felt; while aceſcency greatly affects both the ſtomach and ſyſtem.

With regard to their difference of *ſolution*:—Heavineſs, as it is called, is ſeldom felt from vegetables, except from tough farinaceous paſte, or the moſt viſcid ſubſtances; while the heavineſs of animal food is more frequently noticed, eſpecially when in any great quantity. Difficulty of ſolution does not depend ſo much on firmneſs of texture (as a man, from fiſh of all kinds, is more oppreſſed than from firmer ſubſtances) as on viſcidity; and hence it is more frequent in animal food, eſpecially in the younger animals.

With regard to *mixture*;—There is no inſtance of difficult mixture in vegetables, except in vegetable oils; while animal foods, from both viſcidity and oilineſs, eſpecially the fatter meats, are refractory in this reſpect. Perhaps the difference of animal and vegetable foods might be referred to this head of mixture. For vegetable food continues long in the ſtomach, giving little ſtimulus: Now the ſyſtem is affected in proportion to the extent of this ſtimulus, which is incomparably greater from the animal viſcid oily food, than from the vegetable, firmer, and more aqueous. However, there are certain applications to the ſtomach, which have a tendency to bring on the cold fit of fever, independent of ſtimulus, merely by their refrigeration: and this oftener ariſes from vegetables; as we ſee, in thoſe hot countries where intermittents prevail, they are oftener induced from a ſurfeit of vegetable than of animal food. A proof of this is, that when one is recovering of an intermittent, there is nothing more apt to cauſe a relapſe than cold food, eſpecially if taken on thoſe days when the fit ſhould return, and particularly aceſcent, fermentable vegetables, as ſalad, melons, cucumbers, &c. *acido dulces*, &c. which according to Dr Cullen, are the moſt frequent cauſes of epidemics; therefore, when an intermittent is to be avoided, we ſhun vegetable diet, and give animal foods, although their ſtimulus be greater.

II. *In the Inteſtines.* When the putreſcency of animal food has gone too far, it produces an active ſtimulus, cauſing diarrhœa, dyſentery, &c. But theſe effects are but rare: whereas from vegetable food and its acid, which, united with the bile, proves a pretty ſtrong ſtimulus, they more frequently occur; but, luckily, are of leſs conſequence, if the refrigeration is not very great. In the autumnal ſeaſon, when there is a tendency to dyſentery, if it is obſerved that eating of fruits brings it on, it is rather to be aſcribed to their cooling than ſtimulating the inteſtines.

As to *ſtool*—Wherever neither putrefaction nor acidity has gone a great length, animal food keeps the belly more regular. Vegetable food gives a greater proportion of feculent matter, and, when exſiccated by the ſtomach and inteſtines, is more apt to ſtagnate, and produce ſlow-belly, and coſtiveneſs, than animal ſtimulating food; which, before it comes to the great guts, where ſtoppage is made, has attained a putrefactive tendency, and gives a proper ſtimulus: and thus thoſe who are coſtive from the uſe of vegetables, when they have recourſe to animal food are in this reſpect better.

III. *In the blood-veſſels.* They both give a blood of the ſame kind, but of different quality. Animal food gives it in greater quantity, being in great part, as the expreſſion is, convertible *in ſuccum et ſanguineum*, and of eaſy digeſtion; whereas vegetable is more watery, and contains a portion of unconquerable ſaline matter, which cauſes it to be thrown out of the body by ſome excretion. Animal food affords a more denſe ſtimulating elaſtic blood than vegetable; ſtretching and cauſing a greater reſiſtance in the ſolids, and again exciting their ſtronger action. It has been ſuppoſed, that aceſcency of vegetable food is carried into the blood-veſſels, and there exerts its effects; but the tendency of animal fluids is ſo ſtrong to alkaleſcency, that the exiſtence of acid acrimony in the blood ſeems very improbable. Animal food alone will ſoon produce an alkaleſcent acrimony; and if a perſon who lives entirely on vegetables were to take no food for a few days, his acrimony would be alkaleſcent.

IV. We are next to take notice of the *quantity of nutriment* theſe different foods afford. Nutriment is of two kinds: the firſt repairs the waſte of the ſolid fibres: the other ſupplies certain fluids, the chief of which is oil. Now, as animal food is eaſier converted, and alſo longer retained in the ſyſtem, and as it contains a greater proportion of oil, it will afford both kinds of nutriment more copiouſly than vegetables.

V. Laſtly, *As to the different degrees of perſpirability of theſe foods.* This is not yet properly determined. Sanctorius conſtantly ſpeaks of mutton as the moſt perſpirable of all food, and of vegetables as checking perſpiration. This is a conſequence of the different ſtimulus thoſe foods give to the ſtomach, ſo that perſons who live on vegetables have not their perſpiration ſo ſuddenly excited. In time of digeſtion, perſpiration is ſtopped from whatever food, much more ſo from cooling vegetables. Another reaſon why vegetables are leſs perſpirable is, becauſe their aqueo-ſaline juices determine them to go off by urine, while the more perfectly mixed animal food is more equally diffuſed over the ſyſtem, and ſo goes off by perſpiration. Hence Sanctorius's accounts may be underſtood; for vegetable aliment is not longer retained in the body, but moſtly takes the courſe of the kidneys. Both are equally perſpirable in this reſpect, viz. that a perſon living on either, returns once a-day to his uſual weight; and if we conſider the little nouriſhment of vegetables, and the great tendency of animal food to corpulency, we muſt allow that vegetable is more quickly perſpired than animal food.

As to the queſtion, Whether man was originally deſigned for animal or vegetable food, ſee the article CARNIVOROUS.

With regard to the effects of theſe foods on men, it muſt be obſerved, that there are no perſons who live entirely on vegetables. The Pythagoreans themſelves eat milk; and thoſe who do ſo moſtly, as theſe Pythagoreans, are weakly, ſickly, and meagre, labouring under a conſtant diarrhœa and ſeveral other diſeaſes. None of the hardy, robuſt, live on theſe; but chiefly ſuch as gain a livelihood by the exertion of their mental faculties, as (in the Eaſt-Indies) factors and brokers; and this method of life is now confined to the hot climates, where vegetable diet, without inconvecience, may be carried to great exceſs. Though it be granted, therefore, that man is intended to live on theſe different foods promiſcuouſly, yet the vegetable ſhould be in very great proportion. Thus the Laplanders are ſaid to live entirely on animal food: but this is contradicted by the beſt accounts; for Linnæus ſays, that beſides milk, which they take ſour, to obviate the bad effects of animal food, they uſe alſo calla, menyanthes, and many other plants, copiouſly. So there is no inſtance of any nation living entirely either on vegetable or animal food, though there are indeed ſome who live particularly on one or other in the greateſt proportion. In the cold countries, *e. g.* the inhabitants live chiefly on animal food, on account of the rigour of the ſeaſon, their ſmaller perſpiration, and little tendency to putrefaction.

Of more importance, however, is the following than the former queſtion, viz. *In what proportion animal and vegetable food ought to be mixed?*

1. *Animal* food certainly gives moſt ſtrength to the ſyſtem. It is a known aphoriſm of Sanctorius, that *pondus addit robur;* which may be explained from the impletion of the blood-veſſels, and giving a proper degree of tenſion for the performance of ſtrong oſcillations. Now, animal food not only goes a greater way in ſupplying fluid, but alſo gives the fluid more denſe and elaſtic. The art of giving the utmoſt ſtrength to the ſyſtem is beſt underſtood by thoſe who breed fighting cocks. Theſe people raiſe the cocks to a certain weight, which muſt bear a certain proportion to the other parts of the ſyſtem, and which at the ſame time is ſo nicely proportioned, as that, on loſing a few ounces of it, their ſtrength is very conſiderably impaired. Dr Robinſon of Dublin has obſerved, that the force and weight of the ſyſtem ought to be determined by the largeneſs of the heart, and its proportion to the ſyſtem: for a large heart will give large blood-veſſels, while at the ſame time the viſcera are leſs, particularly the liver; which laſt being increaſed in ſize, a greater quantity of fluid is determined into the cellular texture, and leſs into the ſanguineous ſyſtem.—Hence we ſee how animal food gives ſtrength, by filling the ſanguiferous veſſels. What pains we now beſtow on cocks, the ancients did on the Athletæ, by proper nouriſhment bringing them to a great degree of ſtrength and agility. It is ſaid, that men were at firſt fed on figs, a proof of which we have from their nutritious quality: however, in this reſpect they were ſoon found to fall far ſhort of animal food; and thus we ſee, that men, in ſome meaſure, will work in proportion to the quality of their food. The Engliſh labour more than the Scots; and wherever men are expoſed to hard labour, their food ſhould be animal. Animal food, although it gives ſtrength, yet loads the body; and Hippocrates long ago obſerved, that the athletic habit, by a ſmall increaſe, was expoſed to the greateſt hazards. Hence it is only proper for bodily labours, and entirely improper for mental exerciſes; for whoever would keep his mind acute and penetrating, will exceed rather on the ſide of vegetable food. Even the body is oppreſſed with animal food; a full meal always produces dulneſs, lazineſs, and yawning; and hence the feeding of gameſters, whoſe mind muſt be ready to take advantage, is always performed by avoiding a large quantity of animal food. Farther, with regard to the ſtrength of the body, animal food in the firſt ſtage of life is hardly neceſſary to give ſtrength; in manhood, when we are expoſed to active ſcenes, it is more allowable; and even in the decline of life, ſome proportion of it is neceſſary to keep the body in vigour. There are ſome diſeaſes which come on in the decay of life, at leaſt are aggravated by it; among theſe the moſt remarkable is the gout. This, when it is in the ſyſtem, and does not appear with inflammation in the extremities, has pernicious effects there, attacking the lungs, ſtomach, head, &c. Now to determine this to the extremities, a large proportion

of animal food is neceſſary, eſpecially as the perſon is commonly incapable of much exerciſe.

Animal food, although it gives ſtrength, is yet of many hazards to the ſyſtem, as it produces plethora and all its conſequences. As a ſtimulus to the ſtomach and to the whole ſyſtem, it excites fever, urges the circulation, and promotes the perſpiration. The ſyſtem, however, by the repetition of theſe ſtimuli, is ſoon worn out; and a man who has early uſed the athletic diet, is either early carried off by inflammatory diſeaſes, or, if he takes exerciſe ſufficient to render that diet ſalutary, ſuch an accumulation is made of putreſcent fluids, as in his after-life lays a foundation for the moſt inveterate chronic diſtempers. Therefore it is to be queſtioned, whether we ſhould deſire this high degree of bodily ſtrength, with all the inconveniences and dangers attending it. Thoſe who are chiefly employed in mental reſearches, and not expoſed to too much bodily labour, ſhould always avoid an exceſs of animal food. There is a diſeaſe which ſeems to require animal food, viz. the hyſteric or hypochondriac; and which appears to be very much a-kin to the gout, affecting the alimentary canal. All people affected with this diſeaſe are much diſpoſed to aceſcency; which ſometimes goes ſo far, that no other vegetable but bread can be taken in, without occaſioning the worſt conſequences. Here then we are obliged to preſcribe an animal diet, even to thoſe of very weak organs; for it generally obviates the ſymtoms. However, ſeveral inſtances of ſcurvy in exceſs have been produced by a long-continued uſe of this diet, which it is always unlucky to be obliged to preſcribe, and when it is abſolutely neceſſary to preſcribe, it ſhould be joined with as much of the vegetable as poſſible, and when a cure is performed we ſhould gradually recur to that again.

2. Next, let us conſider the *vegetable* diet. The chief inconveniency of this is difficulty of aſſimilation; which however, in the vigorous and exerciſed, will not be liable to occur. In warm climates, the aſſimilation of vegetable aliment is more eaſy, ſo that *there* it may be more uſed, and when joined to exerciſe gives a pretty tolerable degree of ſtrength and vigour; and though the general rule be in favour of *animal* diet, for giving ſtrength, yet there are many inſtances of its being remarkably produced from vegetable. Vegetable diet has this advantage, that it whets the appetite, and that we can hardly ſuffer from a full meal of it. Beſides the diſorders it is liable to produce in the *primæ viæ*, and its falling ſhort to give ſtrength, there ſeem to be no bad conſequences it can produce in the blood-veſſels; for there is no inſtance where its peculiar acrimony was ever carried there, and it is certainly leſs putrifiable than animal food; nor, without the utmoſt indolence, and a ſharp appetite, does it give plethora, or any of its conſequences: ſo that we cannot here but conclude, that a large proportion of vegetable food is uſeful for the generality of mankind.

There is no error more dangerous, or more common, than the neglect of bread: for it is the ſafeſt of vegetable aliment, and the beſt corrector of animal food; and, by a large proportion of this alone, its bad conſequences, when uſed in a hypochondriac ſtate, have been obviated. The French apparently have as much animal food on their tables as the Britons; and yet, by a greater uſe of bread and the dried acid fruits, its bad effects are prevented: and therefore bread ſhould be particularly uſed by thoſe who are attached to animal food. Vegetable food is not only neceſſary to ſecure health, but long life: and, as we have ſaid, in infancy and youth we ſhould be confined to it moſtly; in manhood, and decay of life, uſe animal food; and, near the end, vegetable again.

There is another queſtion much agitated, viz. *What are the effects of variety in food?* Is it neceſſary and allowable, or univerſally hurtful? Variety of a certain kind ſeems neceſſary; as vegetable and animal foods have their mutual advantages, tending to correct each other. Another variety, which is very proper, is that of liquid and ſolid food, which ſhould be ſo managed as to temper each other; and liquid food, eſpecially of the vegetable kind, is too ready to paſs off before it is properly aſſimilated, while ſolid food makes a long ſtay. But this does not properly belong to the queſtion, whether variety of the ſame kind is neceſſary or proper, as in animal foods, beef, fiſh, fowl, &c. It doth not appear that there is any inconvenience ariſing from this mixture or difficulty of aſſimilation, provided a moderate quantity be taken. When any inconvenience does ariſe, it probably proceeds from this, that one of the particular ſubſtances in the mixture, when taken by itſelf, would produce the *ſame effects*; and, indeed, it would appear, that this effect is not *heightened* by the mixture, but properly *obviated* by it. There are few exceptions to this, if any, *e. g.* taking a large proportion of aceſcent ſubſtances with milk. The coldneſs, &c. acidity, flatulency, &c. may appear; and it is poſſible that the coagulum, from the aceſcency of the vegetables, being ſomewhat ſtronger induced, may give occaſion to too long retention in the ſtomach, and to acidity in too great degree. Again, the mixture of fiſh and milk often occaſions inconveniences. The theory of this is difficult, though, from univerſal conſent, it muſt certainly be juſt. Can we ſuppoſe that fiſh gives occaſion to ſuch a coagulum as runnet? If it does ſo, it may produce bad effects. Beſides, fiſhes approach ſomewhat to vegetables, in giving little ſtimulus; and are accuſed of the ſame bad effects as theſe, viz. bringing on the cold fit of fever.

Thus much may be ſaid for variety. But it alſo has its diſadvantages, provoking to gluttony; this, and the art of cookery, making men take in more than they properly can digeſt: and hence, perhaps, very juſtly, phyſicians have univerſally almoſt preferred ſimplicity of diet; for, in ſpite of rules, man's eating will only be meaſured by his appetite, and ſatiety is ſooner produced by *one* than by *many* ſubſtances. But this is ſo far from being an argument againſt variety, that it is one for it, as the only way of avoiding a full meal of animal food, and its bad effects, is by preſenting a quantity of vegetables. Another mean of preventing the bad effects of animal food, is, to take a large proportion of liquid; and hence the bad effects of animal food are little felt in Scotland, on account of their drinking much with it, and uſing broths, which are at once excellent correctors of animal food, and preventives of gluttony.

With regard to the differences between ANIMAL FOODS, properly ſo called, the firſt regards their ſolubility,

lity, depending on a lax or firm texture of their different kinds.

1. Solubility of animal food ſeems to deſerve leſs attention than is commonly imagined ; for there are many inſtances of perſons of a weak ſtomach incapable of breaking down the texture of vegetables, or even of diſſolving a light pudding, to whom hung beef, or a piece of ham, was very grateful and eaſily digeſted. None of the theories given for the ſolution of animal-food in the human ſtomach ſeems to have explained that proceſs ſufficiently. Long ago has been diſcarded the ſuppoſition of an active corroſive menſtruum there ; and alſo the doctrine of trituration, for which, indeed, there ſeems no mechaniſm in the human body ; and, till lately, phyſicians commonly agreed with Boerhaave in ſuppoſing nothing more to be neceſſary than a watery menſtruum, moderate heat, and frequent agitation. This will account for ſolution in ſome caſes, but not entirely. Let us try to imitate it out of the body with the ſame circumſtances, and in ten times the time in which the food is diſſolved in the ſtomach we ſhall not be able to bring about the ſame changes. Take the coagulated white of an egg, which almoſt every body can eaſily digeſt, and yet no artifice ſhall be able to diſſolve it. Hence, then, we are led to ſeek another cauſe for ſolution, *viz.* fermentation ; a notion, indeed, formerly embraced, but on the introduction of mechanical philoſophy, induſtriouſly baniſhed, with every other ſuppoſition of that proceſs taking place at all in the animal economy.

Many of the ancients imagined this fermentation to be putrefactive. But this we deny, as an acid is produced ; though hence the fermentation might be reckoned the vinous, which, however, ſeems always to be morbid. Neither, indeed, is the fermentation purely acetous, but modified by putreſcence ; for Pringle has obſerved, that animal-matters raiſe and even expede the acetous proceſs. The fermentation, then, in the ſtomach is of a mixed nature, between the acetous and putrefactive, mutually modifying each other ; though, indeed, in the inteſtines, ſomewhat of the putrefactive ſeems to take place, as may be obſerved from the ſtate of the feces broke down, and from the little diſpoſition of ſuch ſubſtances to be ſo, which are not liable to the putrefactive proceſs, as the firmer parts of vegetables, &c. Upon this view ſolution ſeems to be extremely eaſy, and thoſe ſubſtances to be moſt eaſily broke down which are moſt ſubject to putrefaction. See Anatomy, nº 104. and *Gastric Juice*.

But ſolution alſo depends on other circumſtances, and hence requires a more particular regard.

1. There is a difference of ſolubility with reſpect to the manducation of animal-food, for which bread is extremely neceſſary, in order to keep the more ſlippery parts in the mouth till they be properly comminuted*. From want of proper manducation perſons are ſubject to eructations ; and this more frequently from the firm vegetable foods, as apples, almonds, &c. than from the animal, though, indeed, even from animal food, very tendinous, or ſwallowed in unbroken maſſes, ſuch ſometimes occur. Manducation is ſo much connected with ſolution, that ſome, from imperfectly performing that, are obliged to belch up their food, remanducate it, and ſwallow it again before the ſtomach can diſſolve it, or proper nouriſhment be extracted. Another proof of our regard to ſolubility, is our rejecting the firmer parts of animal-food, as bull-beef, and generally carnivorous animals.

2. Its effects with regard to ſolubility ſeem alſo to be the foundation of our choice between *fat* and *lean*, *young* and *old meats*. In the *lean* although perhaps a ſingle fibre might be ſufficiently tender, yet theſe, when collected in *faſciculi*, are very firm and compact, and of difficult ſolution ; whereas in the *fat* there is a greater number of veſſels, a greater quantity of juice, more interpoſition of cellular ſubſtance, and conſequently more ſolubility. Again, in young animals, there is probably the ſame number of fibres as in the older, but theſe more connected : whereas, in the older, the growth depending on the ſeparation of theſe, and the increaſe of veſſels and cellular ſubſtance, the texture is leſs firm and more ſoluble ; which qualities, with regard to the ſtomach, are at that time too increaſed, by the increaſed alkaleſcency of the animal. To this alſo may be referred our choice of caſtrated animals, *viz.* on account of their diſpoſition to fatten after the operation.

3. It is with a view to the ſolubility, that we make a choice between meats recently killed, and thoſe which have been kept for ſome time. As ſoon as meat is killed, the putrefactive proceſs begins ; which commonly we allow to proceed for a little, as that proceſs is the moſt effectual breaker down of animal matters, and a great aſſiſtance to ſolution. The length of time during which meat ought to be kept, is proportioned to the meat's tendency to undergo the putrid fermentation, and the degree of thoſe circumſtances which favour it : Thus, in the torrid zone, where meat cannot be kept above four or five hours, it is uſed much more recent than in the northern climates.

4. *Boiled* or *roaſted* meats create a difference of ſolution. By boiling we extract the juices interpoſed between the fibres, approximate them more to each other, and render them of more difficult ſolubility ; which is increaſed too by the extraction of the juices, which are much more alkaleſcent than the fibres : but when we want to avoid the ſtimulus of alkaleſcent food, and the quick ſolution, as in ſome caſes of diſeaſe, the roaſted is not to be choſen. Of roaſted meat it may be aſked, which are more proper, thoſe which are moſt or leaſt roaſted ? That which is leaſt done is certainly the moſt ſoluble : even raw meats are more ſoluble than dreſſed, as Dr Cullen was informed by a perſon who from neceſſity was obliged, for ſome time, to eat ſuch. But at the ſame time that meats little done are very ſoluble, they are very alkaleſcent ; ſo that, wherever we want to avoid alkaleſcency in the *primæ viæ*, the moſt roaſted meats ſhould be choſen. Thoſe who throw away the broths of boiled meat do very improperly ; for, beſides their ſupplying a fluid from their greater alkaleſcency they increaſe the ſolubility of the meat. Here we ſhall obſerve, that pure blood has been thought inſoluble. Undoubtedly it is very nutritious ; and though out of the body, like the white of eggs, it ſeems very inſoluble, yet, like that too, in the body it is commonly eaſily digeſted. Moſes very properly forbade it the Iſraelites, as in warm countries it is highly alkaleſcent ; and even in Britain when it was uſed in great quantity, the ſcurvy was

* See the article *Bread*.

more frequent: but to a moderate uſe of it, in theſe climates, no ſuch objection takes place.

5. Solubility is varied from another ſource, *viz.* viſcidity of the juice of aliment. Young animals, then, appear more ſoluble than old, not only on account of the compaction and firmneſs of texture in the latter, but alſo their greater viſcidity of juice. And nothing is more common, than to be longer oppreſſed from a full meal of veal, than from the ſame quantity of beef, &c. Upon account, too, of their greater viſcidity of juice, are the tendons and ligamentous parts of animals longer retained than the purely muſcular, as well as on account of their firmneſs of texture. Even fiſhes, whoſe muſcular parts are exceedingly tender, are, on account of their gluey viſcoſity, longer of ſolution in the ſtomach. And eggs, too, which are exceedingly nouriſhing, have the ſame effect, and cannot be taken in great quantity: For the ſtomach is peculiarly ſenſible to gelatinous ſubſtances; and by this means has nature perhaps taught us, as it were by a ſort of inſtinct, to limit ourſelves in the quantity of ſuch nutritive ſubſtances.

6. With regard to ſolution, we muſt take in the oils of animal-food; which, when tolerably pure, are the leaſt putreſcent part of it, and, by diminiſhing the coheſion of the fibres, render them more ſoluble. On this laſt account is the lean of fat meat more eaſily diſſolved than other lean. But when the meat is expoſed to much heat, this oil is ſeparated, leaving the ſolid parts leſs eaſily ſoluble, and becoming itſelf empyreumatic, ranceſcent, and of difficult mixture in the ſtomach. Fried meats, from the reaſons now given, and baked meats, for the ſame, as well as for the tenacity of the paſte, are preparations which diminiſh the ſolubility of food. From what has been ſaid, the preparation of food by fattening it, and keeping it for ſome time after killed, although it may adminiſter to gluttony, will yet, it muſt be confeſſed, increaſe the ſolution of the food.

II. The ſecond difference of animal-food is with regard to ALKALESCENCY.

Of this we have taken a little notice already under the head of *Solubility*.

1. From their too great alkaleſcency we commonly avoid the carnivorous animals, and the *feræ*; and chooſe rather the granivorous. Some birds, indeed, which live on inſects, are admitted into our food; but no man, without *nauſea*, can live upon theſe alone for any length of time. Fiſhes, too, are an exception to this rule, living almoſt univerſally on each other. But in theſe the alkaleſcency does not proceed ſo far; whether from the viſcidity of their juice, their want of heat, or ſome peculiarity in their economy, is not eaſy to determine.

2. Alkaleſcency is determined by difference of age. The older animals are always more alkaleſcent than the young, from their continual progreſs to putrefaction. Homberg always found, in his endeavours to extract an acid from human blood, that more was obtained from the young than from the old animals.

3. A third circumſtance which varies the alkaleſcency of the food, is the wildneſs or tameneſs of the animal; and this again ſeems to depend on its exerciſe. Dr Cullen knew a gentlemen who was fond of cats for food: but he always uſed to feed them on vegetable food, and kept them from exerciſe; and in the ſame manner did the Romans rear up their rats, when intended for food. In the ſame way the fleſh of the partridge and the hen ſeems to be much the ſame; only, from its being more on the wing, the one is more alkaleſcent than the other. Again, tame animals are commonly uſed without their blood; whereas the wild are commonly killed in their blood, and upon that account, as well as their greater exerciſe, are more alkaleſcent.

4. The alkaleſcency of food may be determined from the quantity of volatile ſalt it affords. The older the meat is, it is found to give the greater proportion of volatile ſalt.

5. The alkaleſcency of aliment may alſo, in ſome meaſure, be determined from its colour, the younger animals being whiter and leſs alkaleſcent. We alſo take a mark from the colour of the gravy poured out, according to the redneſs of the juices judging of the animal's alkaleſcency.

6. The reliſh of food is found to depend much on its alkaleſcency, as does alſo the ſtimulus it gives and the fever it produces in the ſyſtem. Theſe effects are alſo complicated with the viſcidity of the food, by which means it is longer detained in the ſtomach, and the want of alkaleſcency ſupplied.

Having mentioned animal food as differing in ſolubility and alkaleſcency, which often go together in the ſame ſubject, we come to the third difference, *viz.*

III. QUANTITY of Nutriment. Which is either abſolute or relative: abſolute with reſpect to the quantity it really contains, ſufficient powers being given to extract it; relative, with reſpect to the aſſimilatory powers of thoſe who uſe it. The abſolute nutriment is of ſome conſequence; but the relative, in the robuſt and healthy, and except in caſes of extraordinary weakneſs, may, without much inconvenience, be diſregarded. In another caſe is the quantity of nouriſhment relative, *viz.* with regard to its *perſpirability*; for if the food is ſoon carried off by the excretions, it is the ſame thing as if it contained a leſs proportion of nouriſhment. For, giving more fluid, that which is longer retained affords moſt; and, for the repair of the ſolids, that retention alſo is of advantage. Now, gelatinous ſubſtances are long retained; and beſides, are themſelves animal ſubſtances diſſolved: ſo that, both abſolutely and relatively, ſuch ſubſtances are nutritious. Of this kind are eggs, ſhell-fiſh, &c. In adults, though it is diſputed whether their ſolids need any repair, yet, at any rate, at this period, fluid is more required; for this purpoſe the alkaleſcent foods are moſt proper, being moſt eaſily diſſolved. They are, at the ſame time, the moſt perſpirable; on one hand that alkaleſcency leading to diſeaſe, while on the other their perſpirability obviates it. Adults, therefore, as writers juſtly obſerve, are better nouriſhed on the alkaleſcent; the young and growing, on gelatinous foods. All this leads to a compariſon of young and old meats; the firſt being more gelatinous, and the laſt more alkaleſcent. This, however, by experience, is not yet properly aſcertained. Mr Geoffroy is the only perſon who has been taken up with the analyſis of foods. See *Memoirs de l'Academie*, l'an. 1731 &c 1732. His attempt was certainly laudable, and in ſome reſpects uſefully performed; but, in general, his experiments were not ſufficiently repeated, nor are indeed ſufficiently accurate. He has not been on his guard againſt the various circumſtances which affect meats; the cow kinds liking a moiſt ſucculent herbage, which is not to be got in warm climates; while the ſheep are fond of a dry food, and thrive beſt there. Again, ſome of his experiments ſeem contradictory. He ſays, that veal gives more ſolution than beef, while lamb gives leſs than mutton; which is much to be doubted. If both he and Sanctorius had examined Engliſh beef, the reſult probably would have been very different as to its perſpirability, &c. Beſides, Mr Geoffroy has only analyſed beef and veal when raw; has made no proper circumſtantial compariſons between quadrupeds and birds; and has examined theſe laſt along with their bones, and not their muſcles, &c. by themſelves, as he ought to have done, &c. If a ſet of experiments of this kind were properly and accurately performed, they might be of great uſe; but at preſent, for the purpoſe of determining our preſent ſubject we muſt have recourſe to our alkaleſcency, ſolubility, &c.

IV. The fourth difference of animal foods is, *The* NATURE *of the* FLUIDS *they afford.* The whole of this will be underſtood from what has been ſaid on alkaleſcency; the fluid produced being more or leſs denſe and ſtimulating, in proportion as that prevails.

V. The fifth difference of animal-foods is with reſpect to their

PERSPIRABILITY. The ſum of what can be ſaid on this matter is this, that ſuch foods as promote an accumulation of fluid in our veſſels, and diſpoſe to plethora, are the leaſt perſpirable, and commonly give moſt ſtrength; that the more alkaleſcent foods are the moſt perſpirable, though the viſcid and leſs alkaleſcent may attain the ſame property by long retention in the ſyſtem. The authors on perſpirability have determined the perſpiration of foods as imperfectly as Mr Geoffroy has done the ſolubility, and in a few caſes only. We muſt not lay hold on what Sanctorious has ſaid on the perſpirability of mutton, becauſe he has not examined in the very ſame way other meats in their perfect ſtate; far leſs on what Keil ſays of oyſters, as he himſelf was a valetudinarian, and conſequently an unfit ſubject for ſuch experiments, and probably of a peculiar temperament.

As to the effects of FOOD on the MIND, we have already hinted at them above. It is plain, that delicacy of feeling, livelineſs of imagination, quickneſs of apprehenſion, and acuteneſs of judgment, more frequently accompany a weak ſtate of the body. True it is indeed, that the ſame ſtate is liable to timidity, fluctuation, and doubt; while the ſtrong have that ſteadineſs of judgment, and firmneſs of purpoſe, which are proper for the higher and more active ſcenes of life. The moſt valuable ſtate of the mind, however, appears to reſide in ſomewhat leſs firmneſs and vigour of body. Vegetable aliment, as never over diſtending the veſſels or loading the ſyſtem, never interrupts the ſtronger motions of the mind; while the heat, fulneſs and weight, of animal food, are an enemy to its vigorous efforts. Temperance, then, does not ſo much conſiſt in the quantity, for that always will be regulated by our apetite, as in the quality, *viz.* a large proportion of vegetable aliment.

A conſiderable change has now taken place in the articles made uſe of as food by the ancients, by ſubſtituting, inſtead of what were then uſed, particularly of the vegetable kind, a number of more bland, agreeable, and nutritive juices. The acorns and nuts of the primitive times have given way to a variety of ſweeter farinaceous ſeeds and roots. To the malvaceous tribe of plants ſo much uſed by the Greeks and Romans, hath ſucceeded the more grateful ſpinach; and to the blite, the garden orach. The rough borage is ſupplanted by the aceſcent ſorrel; and aſparagus has baniſhed a number of roots recorded by the Roman writers under the name of *bulbs*; but Linnæus is of opinion, that the parſnip has undeſervedly uſurped the place of the ſkirret. The bean of the ancients, improperly ſo called, being the roots as well as other parts of the *nymphæa nelumbo* or Indian water-lily, is ſuperſeded by the kidney-bean. The garden rocket, eaten with and as an antidote againſt the chilling qualities of the lettuce, is baniſhed by the more agreeable creſs and tarragon; the apium by the meliorated celery; the pompion, and others of the cucurbitaceous tribe, by the melon; and the ſumach berries, by the fragrant nutmeg. The ſilphium, or ſuccus Cyrenaicus, which the Romans purchaſed from Perſia and India, at a great price, and is thought by ſome to have been the aſafetida of the preſent time, is no longer uſed in preference to the alliaceous tribe.

To turn from the vegetable to ſome of the animal ſubſtitutes, we may mention the carp among fiſhes as having excluded a great number held in high eſtimation among the Romans. The change oil for butter; or honey for ſugar; of mulſa, or liquors made of wine, water, and honey, for the wines of modern times, and that of the ancient zythus for the preſent improved malt liquors; not to mention alſo the *callida* of the Roman taverns; analagous to our tea and coffee.

FOOD of plants. See AGRICULTURE, nº 1—6. and PLANTS; alſo the article COMPOSTS.

FOOL, according to Mr Locke, is a perſon who makes falſe concluſions from right principles; whereas a madman, on the contrary, draws right concluſions from wrong principles. See FOLLY.

FOOL-ſtones, in botany. See ORCHIS.

FOOSHT, an iſland in the Red Sea; ſituated according to the obſervations of Mr Bruce, in N. Lat. 15° 59′ 43″. It is deſcribed by him as above four miles in length from north to ſouth, though only *nine* in circumference. It is low and ſandy in the ſouthern part, but the north riſes in a black hill of inconſiderable height. It is covered with a kind of bent-graſs, which never arrives at any great length by reaſon of want of rain and the conſtant browzing of the goats. There are great appearances of the black hill having once been a volcano; and near the north cape the ground ſounds hollow like the Solfaterra in Italy. There are a vaſt number of beautiful fiſh met with upon the coaſts, but few fit for eating; and our traveller obſerved, that the moſt beautiful were the moſt noxious when eaten; none, indeed, being ſalutary food excepting thoſe which reſembles the fiſh of the northern ſeas. There are many beautiful ſhell-fiſh, as the concha veneris, of ſeveral colours and ſizes; ſea-urchins, &c. Spunges are likewiſe found all along the coaſt. There are alſo pearls, but neither large nor of a good water; in conſequence of which they ſell at no great price. They are produced by a ſpecies of bivalve ſhells. Several

veral large ſhells, from the fiſh named *biſſer*, are met with upon ſtones of ten or twelve tons weight along the coaſt. They are turned upon their faces and ſunk into the ſtones, as in a paſte, the ſtone being raiſed all about them in ſuch a manner as to cover the edge of the ſhell; " a proof (ſays Mr Bruce) that this ſtone muſt ſome time lately have been ſoft or liquefied: for had it been long ago, the ſun and air would have worn the ſurface of the ſhell; but it ſeems perfectly entire, and is ſet in that hard brown rock as the ſtone of a ring is in a golden chaſing."—The water in this iſland is very good.

The inhabitants of Fooſht are poor fiſhermen of a ſwarthy colour; going naked, excepting only a rag about their waiſt. They have no bread but what they procure in exchange for the fiſh they catch. What they barter in this manner is called *ſeajan*. But beſides this they catch another ſpecies, which is flat, with a long tail, and the ſkin made uſe of for ſhagreen, of which the handles of knives and ſwords are made. There is a ſmall town on the iſland, conſiſting of about 30 huts, built with faggots of bent graſs or ſpartum, ſupported by a few ſticks, and thatched with graſs of the ſame kind of which they are built.

FOOT, a part of the body of moſt animals whereon they ſtand, walk, &c. See ANATOMY. nº 63.

FOOT in the Latin and Greek poetry, a metre or meaſure, compoſed of a certain number of long and ſhort ſyllables.

Theſe feet are commonly reckoned 28: of which ſome are ſimple, as conſiſting of two or three ſyllables, and therefore called *diſſyllabic* or *triſyllabic feet*; others are compound, conſiſting of four ſyllables, and are therefore called *tetraſyllabic feet*.

The diſſyllabic feet are four in number, *viz.* the pyrrhichius, ſpondeus, iambus, and trocheus. See PYRRHICHIUS, &c.

The triſyllabic feet are eight in number, *viz.* the dactylus, anapæſtus, tribrachys, moloſſus, amphibrachys, amphimacer, bacchius, and antibacchius. See DACTYL, &c.

The tetraſyllabic are in number 16, *viz.* the procleuſmaticus, diſpondeus, choriambus, antiſpaſtus, diiambus, dichoreus, ionicus a majore, ionicus a minore epitrius primus, epitritus ſecundus, epitritus tertius, epitritus quartus, pæon primus, pæon ſecundus, pæon tertius, and pæon quartus. See PROCLEUSMATICUS, &c.

FOOT is alſo a long meaſure conſiſting of 12 inches.

Geometricians divide the foot into 10 digits and the digit into 10 lines.

Foot-Halt, the name of a particular diſorder incident to ſheep. It takes its ſource from an inſect, which when it comes to a certain maturity, reſembles a worm of two, three, or four inches in length. The firſt appearance of the malady is, when the ſheep gives ſigns of being lame, which increaſes to ſo high a degree as to prevent grazing; when, what with want of ſufficient food and pain, the poor animal ſuffers greatly, and lingers till it dies a natural death, if not properly attended to by extracting the inſect or worm; the ſooner the better as it is very eaſily performed.

As ſoon as the lameneſs is perceived, let the foot that is lame be examined between the cloſe of the claws, and it will be found that in the ſkin where the cloſe ſeparates is a ſmall hole (not natural), through which the inſect, when yet ſmall, gets its entrance, and by degrees has worked itſelf upwards along the leg, between the outward ſkin and bone, and obtains its largeſt magnitude. Proportionally it finds its nouriſhment, and is left undiſturbed. This worm muſt be extracted by moving the claws backward and forward in contrary directions; and it will not be long before the under part of the worm makes its appearance at the abovementioned ſmall hole, and continuing the ſame operation of moving the claws, the whole worm will work itſelf out; which is better than when at its firſt appearance it ſhould be drawn out with danger of breaking off, and part of it ſhould remain in the ſheep's leg, and by its rotting there may be hurtful. This eaſy and ſimple operation will be found effectual without any other kind of application whatever, nature herſelf curing the channel which the worm had made along the leg.

It is obſerved, this malady is in ſome years more prevalent than in others, particularly in wet ſeaſons than in drier; more obſerved to begin in ſpring and autumn than in ſummer and winter; notwithſtanding what with ſnow, &c. ſheep ſuffer more by the wet in winter than in any of the other ſeaſons (poſſibly it is not then the ſeaſon for this ſort of inſect). In high healthy grounds, the ſheep are leſs liable to it than in low marſhy and meadow grounds: from all which circumſtances it may be ſuppoſed, that this inſect in its firſt ſtate, has for its moſt natural element either the earth, water, or air; and only gets accidentally between the cloſe of the claws of the ſheep, and finds there what is ſufficient for its nouriſhment and ſecurity.

Foot Square, is the ſame meaſure both in breadth and length containing 144 ſquare or ſuperficial inches.

Cubic or *Solid Foot*, is the ſame meaſure in all the three dimenſions, length, breadth, and depth or thickneſs, containing 1728 cubic inches.

Foot of a Horſe, in the manege, the extremity of the leg, from the coronet to the lower part of the hoof.

Foot-Level, among artificers, an inſtrument that ſerves as a foot rule, a ſquare, and a level. See LEVEL, RULE, and SQUARE.

FOOTE (Samuel, Eſq), the modern Ariſtophanes, was born at Truro, in Cornwall; and was deſcended from a very ancient family. His father was member of parliament for Tiverton, in Devonſhire; and enjoyed the poſt of commiſſioner of the prize-office and fine-contract. His mother was heireſs of the Dinely and Goodere families. In conſequence of a fatal miſunderſtanding between her two brothers, Sir John Dinely Goodere, Bart. and Samuel Goodere, Eſq; captain of his majeſty's ſhip the Ruby, which ended in the death of both, a conſiderable part of the Goodere eſtate, which was better than 5000 l. *per annum*, deſcended to Mr Foote.

He was educated at Worceſter college, Oxford, which owed its foundation to Sir Thomas Cookes Winford, Bart. a ſecond couſin of our author's. On leaving the univerſity, he commenced ſtudent of law in the Temple; but as the dryneſs of this ſtudy did not ſuit the livelineſs of his genius, he ſoon relinquiſhed it.

He married a young lady of a good family and ſome fortune; but their tempers not agreeing, a perfect harmony did not long ſubſiſt between them. He now launched into all the faſhionable foibles of the age, gaming not excepted; and in a few years ſpent his whole fortune. His neceſſities led him to the ſtage, and he made his firſt appearance in the character of Othello. He next performed Fondlewife with much more applauſe; and this, indeed, was ever after one of his capital parts. He attempted Lord Foppington likewiſe, but prudently gave it up. But as Mr Foote was never a capital actor in the plays of others, his ſalary was very unequal to his gay and extravagant turn; and he contracted debts which forced him to take refuge within the verge of the court. On this occaſion he relieved his neceſſities by the following ſtratagem. Sir Fr—s D—l—l had long been his intimate friend, and had diſſipated his fortune by ſimilar extravagance. Lady N-ſſ-u P—l-t, who was likewiſe an intimate acquaintance of Foote's, and who was exceeding rich, was fortunately at that time bent upon a matrimonial ſcheme. Foote ſtrongly recommended to her to conſult upon this momentous affair the conjurer in the Old Bailey, whom he repreſented as a man of ſurpriſing ſkill and penetration. He employed an acquaintance of his own to perſonate the conjurer; who depicted Sir Fr—s D—l—l at full length; deſcribed the time when, the place where, and the dreſs in which ſhe would ſee him. The lady was ſo ſtruck with the coincidence of every circumſtance, that ſhe married D–l–l in a few days. For this ſervice Sir Francis ſettled an annuity upon Foote; and this enabled him once more to emerge from obſcurity.

In 1747 he opened the little theatre in the Haymarket, taking upon himſelf the double character of author and performer; and appeared in a dramatic piece of his own compoſing, called the *Diverſions of the Morning*. This piece conſiſted of nothing more than the exhibition of ſeveral characters well known in real life; whoſe manner of converſation and expreſſion this author very happily hit off in the diction of his drama, and ſtill more happily repreſented on the ſtage, by an exact and moſt amazing imitation, not only of the manner and tone of voice, but even of the very perſons, of thoſe whom he intended to take off. In this performance, a certain phyſician, Dr L—n, well known for the oddity and ſingularity of his appearance and converſation, and the celebrated chevalier Taylor, who was at that time in the height of his popularity, were made objects of Foote's ridicule; the latter, indeed, very deſervedly; and, in the concluding part of his ſpeech, under the character of a theatrical director, Mr Foote took off, with great humour and accuracy, the ſeveral ſtyles of acting of every principal performer on the Engliſh ſtage. This performance at firſt met with ſome oppoſition from the civil magiſtrates of Weſtminſter, under the ſanction of the act of parliament for limiting the number of playhouſes, as well as from the jealouſy of one of the managers of Drury-lane playhouſe; but the author being patroniſed by many of the principal nobility, and other perſons of diſtinction, this oppoſition was over-ruled, and having altered the title of his performance, Mr Foote proceeded, without further moleſtation, to give *Tea in a Morning* to his friends, and repreſented it through a run of 40 mornings, to crowded and ſplendid audiences.—The enſuing ſeaſon he produced another piece of the ſame kind, which he called *An Auction of Pictures*. In this performance he introduced ſeveral new and popular characters; particularly Sir Thomas de Veil, then the acting juſtice of peace for Weſtminſter, Mr Cock the celebrated auctioneer, and the equally famous orator Henley. This piece alſo had a very great run.—His *Knights*, which was the produce of the enſuing ſeaſon, was a performance of ſomewhat more dramatic regularity: but ſtill, although his plot and characters ſeemed leſs immediately perſonal, it was apparent that he kept ſome particular real perſons ſtrongly in his eye in the performance; and the town took upon themſelves to fix them where the reſemblance appeared to be the moſt ſtriking.—Thus Mr Foote continued from time to time to ſelect, for the entertainment of the public, ſuch characters, as well general as individual, as ſeemed moſt likely to engage their attention. His dramatic pieces, excluſive of the interlude called *Piety in Pattens*, are as follow: Taſte, The Knights, The Author, The Engliſhman in Paris, The Engliſhman returned from Paris, The Mayor of Garrat, The Liar, The Patron, The Minor, The Orators, The Commiſſary, The Devil upon Two Sticks, The Lame Lover, The Maid of Bath, The Nabob, The Cozeners, The Capuchin, The Bankrupt, and an unfiniſhed comedy, called the Slanderer.—All theſe works are only to be ranked among the *petites pièces* of the theatre. In the execution they are ſomewhat looſe, negligent, and unfiniſhed; the plots are often irregular, and the cataſtrophes not always concluſive: but, with all theſe deficiencies, they contain more ſtrength of character, more ſtrokes of keen ſatire, and more touches of temporary humour, than are to be found in the writings of any other modern dramatiſt. Even the language ſpoken by his characters, incorrect as it may ſometimes ſeem, will on a cloſer examination be found entirely dramatical; as it abounds with thoſe natural minutiæ of expreſſion which frequently form the very baſis of character, and which render it the trueſt mirror of the converſation of the times in which he wrote.

In the year 1766, being on a party of pleaſure with the late duke of York, lord Mexborough, and Sir Francis Delaval, Mr. Foote had the misfortune to break his leg, by a fall from his horſe; in conſequence of which, he was compelled to undergo an amputation. This accident ſo ſenſibly affected the duke, that he made a point of obtaining for Mr Foote a patent for life: whereby he was allowed to perform, at the little theatre in the Haymarket, from the 15th of May to the 15th of September every year.

He now became a greater favourite of the town than ever: his very laughable pieces, with his more laughable performance, conſtantly filled his houſe: and his receipts were ſome ſeaſons almoſt incredible. Parſimony was never a vice to be aſcribed to Mr Foote; his hoſpitality and generoſity were ever conſpicuous; he was viſited by the firſt nobility, and he was ſometimes honoured even by royal gueſts.

The attack made upon his character by one of his domeſtics, whom he had diſmiſſed for miſbehaviour, is too well known to be particularized here. Suffice it to ſay, he was honourably acquitted of that charge: but it is believed by ſome, that the ſhock which he received from it accelerated his death ; others pretend, that his literary altercation with a certain *then* ducheſs, or rather her agents, much affected him, and that from that time his health declined. It is probable, however, that his natural volatility of ſpirits could ſcarcely fail to ſupport him againſt all impreſſions from either of theſe quarters.

Mr Foote, finding his health decline, entered into an agreement with Mr Colman, for his patent of the theatre ; according to which, he was to receive from Mr Colman L.1600 *per annum*, beſides a ſtipulated ſum whenever he choſe to perform. Mr Foote made his appearance two or three times in ſome of the moſt admired characters ; but being ſuddenly affected with a paralytic ſtroke one night whilſt upon the ſtage, he was compelled to retire. He was adviſed to bathe ; and accordingly repaired to Brightelmſtone, where he apparently recovered his former health and ſpirits, and was what is called the *fiddle of the company* who reſorted to that agreeable place of amuſement. A few weeks before his death he returned to London ; but, by the advice of his phyſicians, ſet out with an intention to ſpend the winter at Paris and in the ſouth of France. He had got no farther than Dover, when he was ſuddenly attacked by another ſtroke of the palſy, which in a few hours terminated his exiſtence. He died on the 21ſt of October 1777, in the 56th year of his age, and was privately interred in the cloiſters of Weſtminſter-Abbey.

FOP, probably derived from the *vappa* of Horace, applied in his firſt ſatire in his firſt book to the wild and extravagant Nævius, is uſed among us to denote a perſon who cultivates a regard to adventitious ornament and beauty to exceſs.

FORAMEN, in anatomy, a name given to ſeveral apertures or perforations in divers parts of the body ; as, 1. The external and internal foramina of the cranium or ſkull. 2. The foramina in the upper and lower jaw. 3. Foramen lachrymale. 4. Foramen membranæ tympani.

Foramen Ovale, an oval aperture or paſſage through the heart of a fœtus, which cloſes up after birth. It ariſes from the coronal vein, near the right auricle, and paſſes directly into the left auricle of the heart, ſerving for the circulation of the blood in the fœtus, till ſuch time as the infant breathes, and the lungs are open ; it being generally reckoned one of the temporary parts of the fœtus, wherein it differs from an adult ; although almoſt all anatomiſts, Mr Cheſelden excepted, aſſures us, that the foramen ovale has ſometimes been found in adults. See Foetus.

FORBES (Patrick), biſhop of Aberdeen, was born in 1654, when the affairs of the church of Scotland were in much confuſion ; to the ſettlement of which he greatly contributed. As chancellor of the univerſity of Aberdeen, he improved that ſeat of learning by repairing the fabric, augmenting the library, and reviving the profeſſorſhips. He publiſhed a *Commentary on the Revelations*, at London, in 1613 ; and died in 1635.

Forbes (John), the ſon of Patrick, but of much more extenſive learning than his father, was perhaps excelled by none of his age, which will be allowed by thoſe who read his *Hiſtorical and Theological Inſtitutes*. He was biſhop of Aberdeen ; but was expelled by the Covenanters, and forced to fly beyond ſea. He continued in Holland two years ; and, upon his return, lived private on his eſtate at Corſe, until he died in 1648. An edition of all his works was printed in two volumes folio at Amſterdam, in 1703.

Forbes (William), a learned biſhop of Edinburgh, born in 1585. His ill-health and the anti-epiſcopal diſpoſition of the Scots, confined him chiefly to a retired life ; but when Charles I. in 1633, founded an epiſcopal church at Edinburgh, he thought none more worthy to fill the ſee than Mr Forbes ; who, however, died three months after his conſecration, in 1634. Though very able and learned, he publiſhed nothing ; but wrote a treatiſe to pacify controverſies, which was printed at London 24 years after his death.

Forbes (Duncan, Eſq. of Culloden), was born in the year 1685. In his early life, he was brought up in a family remarkable for hoſpitality ; which, perhaps, led him afterwards to a freer indulgence in ſocial pleaſures. His natural diſpoſition inclined him to the army : but, as he ſoon diſcovered a ſuperior genius, by the advice of his friends he applied himſelf to letters. He directed his ſtudies particularly to the civil law ; in which he made a quick progreſs, and in 1709 was admitted an advocate. From 1722 to 1737, he repreſented in parliament the boroughs of Inverneſs, Fortroſe, Nairn, and Forres. In 1725, he was made king's advocate ; and lord preſident of the court of ſeſſion in 1737. In the troubles of 1715 and 1745 he eſpouſed the royal cauſe ; but with ſo much prudence and moderation did he conduct himſelf at this delicate conjuncture, that not a whiſper was at any time heard to his prejudice. The glory he acquired in advancing the proſperity of his country, and in contributing to re-eſtabliſh peace and order, was the only reward of his ſervices. He had even impaired, and almoſt ruined, his private fortune in the cauſe of the public ; but government did not make him the ſmalleſt recompence. The miniſter, with a meanneſs for which it is difficult to account, deſired to have a ſtate of his diſburſements. He was ſo much ſhocked at the rudeneſs of this treatment, that he left the miniſter without making any reply. Throughout the whole courſe of his life he had a lively ſenſe of religion, without the leaſt taint of ſuperſtition ; and his charity was extended to every ſect and denomination of religioniſts indiſcriminately. He was well verſed in the Hebrew language ; and wrote, in a flowing and oratorial ſtyle, concerning religion natural and revealed, ſome important diſcoveries in theology and philoſophy, and concerning the ſources of incredulity. He died in 1747, in the 62d year of his age ; and his works have ſince been publiſhed in two volumes octavo.

FORCE, in philoſophy, denotes the cauſe of the change in the ſtate of a body, when, being at reſt, it begins to move, or has a motion which is either not uniform or not direct. While a body remains in the ſame ſtate, either of reſt or of uniform or rectilinear motion, the cauſe of its remaining in ſuch a ſtate is in the nature of the body, and it cannot be ſaid that any extrinſic force has acted on it. This internal cauſe or principle is called *inertia*.

Mechanical forces may be reduced to two ſorts ; one of a body at reſt, the other of a body in motion.

The force of a body at reſt, is that which we conceive to be in a body lying ſtill on a table, or hanging by a rope, or ſupported by a ſpring, &c. and this is called by the names of *preſſure*, *tenſion*, *force*, or *vis mortua*, *ſolicitatio*, *conatus movendi*, *conamen*, &c. To this claſs alſo of forces we muſt refer centripetal and centrifugal forces, though they reſide in a body in motion; becauſe theſe forces are homogeneous to weights, preſſures, or tenſions of any kind.

The force of a body in motion is a power reſiding in that body ſo long as it continues its motion; by means of which it is able to remove obſtacles lying in its way; to leſſen, deſtroy, or overcome the force of any other moving body, which meets it in an oppoſite direction; or to ſurmount any dead preſſure or reſiſtance, as tenſion, gravity, friction, &c. for ſome time, but which will be leſſened or deſtroyed by ſuch reſiſtance as leſſens or deſtroys the motion of the body. This is called *moving force*, *vis motrix*, and by ſome late writers *vis viva*; to diſtinguiſh it from the *vis mortua* ſpoken of before; and by theſe appellations, however different, the ſame thing is underſtood by all mathematicians; namely, that power of diſplacing, of withſtanding oppoſite moving forces, or of overcoming any dead reſiſtance, which reſides in a moving body, and which, in whole or in part, continues to accompany it, ſo long as the body moves. See MECHANICS.

We have ſeveral curious as well as uſeful obſervations in Deſagulier's Experimental Philoſophy, concerning the comparative forces of men and horſes, and the beſt way of applying them. A horſe draws with the greateſt advantage when the line of direction is level with his breaſt; in ſuch a ſituation, he is able to draw 200lb. eight hours a-day, walking about two miles and an half an hour. And if the ſame horſe is made to draw 240lb. he can work but ſix hours a-day, and cannot go quite ſo faſt. On a carriage, indeed, where friction alone is to be overcome, a middling horſe will draw a 1000lb. But the beſt way to try a horſe's force, is by making him draw up out of a well, over a ſingle pulley or roller; and in ſuch a caſe, one horſe with another, will draw 200lb. as already obſerved.

Five men are found to be equal in ſtrength to one horſe, and can, with as much eaſe, puſh round the horizontal beam of a mill, in a walk 40 feet wide; whereas three men will do it in a walk only 19 feet wide.

The worſt way of applying the force of a horſe, is to make him carry or draw up hill: for if the hill be ſteep, three men will do more than a horſe, each man climbing up faſter with a burden of 100lb. weight, than a horſe that is loaded with 300lb. a difference which is owing to the poſition of the parts of the human body being better adapted to climb than thoſe of a horſe.

On the other hand, the beſt way of applying the force of a horſe, is an horizontal direction, wherein a man can exert leaſt force: thus a man, weighing 140lb. and drawing a boat along by means of a rope coming over his ſhoulders, cannot draw above 27lb. or exert above one-ſeventh part of the force of a horſe employed to the ſame purpoſe.

The very beſt and moſt effectual poſture in a man, is that of rowing; wherein he not only acts with more muſcles at once for overcoming the reſiſtance, than in any other poſition; but as he pulls backwards, the weight of his body aſſiſts by way of lever. See Deſaguliers, Exp. Phil. vol. i. p. 241. where we have ſeveral other obſervations relative to force acquired by certain poſitions of the body, from which that author accounts for moſt feats of ſtrength and activity. See alſo a *Memoire* on this ſubject by M. de la Hire, in Mem. Roy. Acad. Sc. 1629; or in Deſaguliers, Exp. &c. p. 267, &c. who has publiſhed a tranſlation of part of it with remarks.

FORCE, in law, ſignifies any unlawful violence offered to things or perſons, and is divided into ſimple and compound. *Simple force* is what is ſo committed, that it has no other crime attending it; as where a perſon by force enters on another's poſſeſſion without committing any other unlawful act. *Compound force*, is where ſome other violence is committed with ſuch an act which of itſelf alone is criminal; as if one enters by force into another's houſe, and there kills a perſon, or raviſhes a woman. There is likewiſe a force implied in law, as in every treſpaſs, reſcue, or diſſeiſin, and an actual force with weapons, number of perſons, &c.—Any perſon may lawfully enter a tavern, inn, or victualling-houſe; ſo may a landlord his tenant's houſe to view repairs, &c. But if, in theſe caſes, the perſon that enters commits any violence or force, the law will intend that he entered for that purpoſe.

FORCEPS, in ſurgery, &c. a pair of ſciſſars for cutting off or dividing the fleſhy membranous parts of the body, as occaſion requires. See SURGERY.

FORCIBLE ENTRY, is a violent and actual entry into houſes or lands; and a forcible detainer, is where one by violence with-holds the poſſeſſion of lands, &c. ſo that the perſon who has a right of entry is barred, or hindered, therefrom.

At common law, any perſon that had a right to enter into lands, &c. might retain poſſeſſion of it by force. But this liberty being abuſed, to the breach of the peace, it was therefore found neceſſary that the ſame ſhould be reſtrained: Though at this day, he who is wrongfully diſpoſſeſſed of goods may by force retake them. By ſtatute, no perſons ſhall make an entry on any lands or tenements, except where it is given by law, and in a peaceable manner, even tho' they have title of entry, on pain of impriſonment: and where a forcible entry is committed, juſtices of peace are authorized to view the place, and enquire of the force by a jury, ſummoned by the ſheriff of the county; and they may cauſe the tenements, &c. to be reſtored, and impriſon the offenders till they pay a fine. Likewiſe a writ of forcible entry lies, where a perſon ſeiſed of freehold, is by force put out thereof.

FORCIBLE *Marriage*, of a woman of eſtate, is felony. For by the the ſtatute 3 H. 7. c. 2. it is enacted, "That if any perſons ſhall take away any woman having lands or goods, or that is heir-apparent to her anceſtor, by force, and againſt her will, and *marry* or *defile* her; the takers, procurers, abettors, and receivers, of the woman taken away againſt her will, and knowing the ſame, ſhall be deemed principal felons; but as to procurers, and acceſſories, they are, before the offence be committed, to be excluded the benefit of clergy, by

Jacob's Law Dict.

39 Eliz. c. 9. The indictment on the ſtatute 3 H. 7. is expreſsly to ſet forth, that the woman taken away had lands or goods, or was heir apparent; and alſo that ſhe was married or defiled, becauſe no other caſe is within the ſtatute; and it ought to allege that the taking was for lucre. It is no excuſe that the woman at firſt was taken away with her conſent: for if ſhe afterwards refuſe to continue with the offender, and be forced againſt her will, ſhe may from that time properly be ſaid to be taken againſt her will; and it is not material whether a woman ſo taken away be at laſt married or defiled with her own conſent or not, if ſhe were under force at the time; the offender being in both caſes equally within the words of the act.

Thoſe perſons who, after the fact, receive the offender, are but acceſſories after the offence, according to the rules of common law; and thoſe that are only privy to the damage, but not parties to the forcible taking away, are not within the act, H. P. C. 119. A man may be indicted for taking away a woman by force in another country; for the continuing of the force in any country, amounts to a forcible taking there. *Ibid.* Taking away any woman-child under the age of 16 years and unmarried, out of the cuſtody and without the conſent of the father or guardian, &c. the offender ſhall ſuffer fine and impriſonment; and if the woman agrees to any contract of matrimony with ſuch perſon, ſhe ſhall forfeit her eſtate during life, to the next of kin to whom the inheritance ſhould deſcend, &c. Stat. 4 & 5. P. & M. c. 8. This is a force againſt the parents; and an information will lie for ſeducing a young man or woman from their parents, againſt their conſents, in order to marry them, &c. See MARRIAGE.

FORCING, in gardening, a method of producing ripe fruits from trees before their natural ſeaſon. The method of doing it is this: A wall ſhould be erected ten feet high; a border muſt be marked out on the ſouth ſide of it, of about four feet wide, and ſome ſtakes muſt be faſtened into the ground all along the edge of the border; theſe ſhould be four inches thick. They are intended to reſt the glaſs lights upon, which are to ſlope backwards to the wall, to ſhelter the fruit as there ſhall be occaſion; and there muſt be, at each end, a door to open either way, according as the wind blows. The frame ſhould be made moveable along the wall, that when a tree has been forced one year, the frame may be removed to another, and ſo on, that the trees may each of them be forced only once in three years, at which rate they will laſt a long time. They muſt be always well-grown trees that are choſen for forcing; for young ones are ſoon deſtroyed, and the fruit that is produced from them is never ſo well taſted. The fruits moſt proper for this management are the avant or ſmall white nutmeg, the albemarle, the early newington, and the brown nutmeg peaches; Mr Fairchild's early, and the elrugo and newington nectarines; the maſculine apricot, and the may-duke and may cherry. For grapes, the white and black ſweetwater are the propereſt; and of gooſeberries the Dutch white, the Dutch early green, and the walnut gooſeberry; and the large Dutch white and large Dutch red currants.

The dung, before it is put to the wall, ſhould be laid together in a heap for five or ſix days, that it may heat uniformly through; and when thus prepared it muſt be laid four feet thick at the baſe of the wall, and go ſloping up till it is two feet thick at the top. It muſt be laid at leaſt within three or four inches of the top of the wall; and when it ſinks, as it will ſink two or three feet, more dung muſt be laid on; for the firſt heat will do little more than juſt ſwell the bloſſom-buds. The covering the trees with glaſſes is of great ſervice; but they ſhould be taken off to admit the benefit of gentle ſhowers to the trees, and the doors at the ends ſhould be either left entirely open, or one or both of them opened, and a mat hung before them, at once to let the air circulate and keep off the froſts.

The dung is never to be applied till towards the end of November; and three changes of it will be ſufficient to ripen the cherries, which will be very fine in February. As to the apricots, grapes, nectarines, peaches, and plums, if the weather be milder, the glaſſes are to be opened to let in ſunſhine or gentle ſhowers.

If a row or two of ſcarlet ſtrawberries be planted at the back of the frame, they will ripen in February or the beginning of March; the vines will bloſſom in April, and the grapes will be ripe in June.

It ſhould be carefully obſerved, not to place early and late ripening fruits together, becauſe the heat neceſſary to force the late ones will be of great injury to the early ones after they have fruited.

The maſculine apricot will be ripe in the beginning of April, the early nectarines will be ripe about the ſame time, and the forward ſort of plums by the latter end of that month. Gooſeberries will have fruit fit for tarts in January or February, and will ripen in March; and currants will have ripe fruit in April.

The trees need not be planted ſo diſtant at theſe walls as at others, for they do not ſhoot ſo freely as in the open air; nine feet aſunder is ſufficient. They ſhould be pruned about three weeks before the heat is applied.

FORCING, in the wine trade, a term uſed by the wine-coopers for the fining down wines, and rendering them fit for immediate draught. The principal inconvenience of the common way of fining down the white-wines by iſinglaſs, and the red by whites of eggs, is the ſlowneſs of the operation; theſe ingredients not performing their office in leſs than a week, or ſometimes a fortnight, according as the weather proves favourable, cloudy or clear, windy or calm: this appears to be matter of conſtant obſervation. But the wine-merchant frequently requires a method that ſhall, with certainty, make the wines fit for taſting in a few hours. A method of this kind there is, but it is kept in a few hands a valuable ſecret. Perhaps it depends upon a prudent uſe of a tartarized ſpirit of wine, and the common forcing, as occaſion is, along with gypſum, as the principal; all which are to be well ſtirred about in wine, for half an hour before it is ſuffered to reſt.

FORDOUN (John of), the father of Scottiſh hiſtory, flouriſhed in the reign of Alexander III. towards the end of the 13th centruy. But of his life there is nothing known with certainty, though there was not a monaſtery that poſſeſſed not copies of his work. The firſt five books of the hiſtory which bears his name were written by him: the reſt were fabricated from materials left by him, and from new collections by different perſons. A manuſcript of vellum of this hiſtorian is in the library of the univerſity of Edinburgh.

FORDWICH, a town of Kent, called in the Doomſday-Book "the little Borough of Fordwich," is a member of the port of Sandwich, and was anciently incorporated by the ſtyle of the Barons of the town of Fordwich, but more lately by the means of the mayor, jurats, and commonalty, who enjoy the ſame privileges as the cinque-ports. This place is famous for excellent trouts in its river Stour.

FORDYCE (David), an elegant and learned writer of the preſent age, was profeſſor of philoſophy in the Mariſchal-college, Aberdeen. He was originally deſigned for the miniſtry; to prepare himſelf for which was the whole aim of his ambition, and for a courſe of years the whole purpoſe of his ſtudies. How well he was qualified to appear in that character, appears from his "Theodorus, a dialogue concerning the art of preaching.' After having finiſhed this work, he went abroad on his travels, in order to obtain freſh ſtores of knowledge; but after a ſucceſsful tour through ſeveral parts of Europe, he was unfortunately caſt away in a ſtorm on the coaſt of Holland. Beſides the above work, he wrote Dialogues on Education, 8vo, and a Treatiſe of Moral Philoſophy publiſhed in the Preceptor. The third edition of his Theodorus was publiſhed in London, after his untimely death, by his brother the Rev. Mr James Fordyce, an eminent diſſenting miniſter, in 1755.

FORE, applied to a ſhip, denotes all that part of a ſhip's frame and machinery which lies near the ſtem.

Fore and aft is uſed for the whole ſhip's length, or from end to end.

FORECASTLE *of a Ship*, that part where the fore maſt ſtands. It is divided from the reſt by a bulkhead.

FOREIGN, ſomething extraneous, or that comes from abroad. The word is formed from the Latin *fores*, "doors;" or *foris*, "out of doors;" or *forum*, "market," &c.

Foreign miniſter, foreign prince, foreign goods, &c. are thoſe belonging to other nations. See MINISTER, &c.

Foreign to the purpoſe, ſignifies a thing remote or impertinent.

FOREIGN, in the Engliſh law, is uſed in various ſignifications. Thus,

FOREIGN Attachment, is an attachment of the goods of foreigners found within a city or liberty, for the ſatisfaction of ſome citizens to whom the foreigner is indebted; or it ſignifies an attatchment of a foreigner's money in the hands of another perſon.

FOREIGN Kingdom, a kingdom under the dominion of a foreign prince.

At the inſtance of an ambaſſador or conſul, any offender againſt the laws may be ſent for from a foreign kingdom to which he hath fled. And, where a ſtranger of Holland, or any foreign country, buys goods at London, for inſtance, and there gives a note under his hand for payment, and then goes away privately into Holland; in that caſe, the ſeller may have a certificate from the lord mayor, on the proof of the ſale and delivery of ſuch goods, whereupon a proceſs will be executed on the party in Holland.

FOREIGN Oppoſer, or *Appoſer*, an officer in the Engliſh exchequer that oppoſes or makes a charge on all ſheriffs, &c. of their green wax; that is to ſay, fines, iſſues, amerciaments, recognizances, &c.

FOREIGN Plea, ſignifies an objection to the judge of the court, by refuſing him as incompetent, becauſe the matter in queſtion is not within his juriſdiction.

FOREIGN Seamen, ſerving two years on board Britiſh ſhips, whether of war, trade, or privateers, during the time of war ſhall be deemed natural-born ſubjects.

FOREIGNER, the natural-born ſubject to ſome foreign prince.

Foreigners, in Britain, though made denizens, or naturalized, are diſabled to bear any office of government, to be of the privy counſel, or members of parliament, &c. This is by the acts of the ſettlement of the crown. Such perſons as are not freemen of a city or corporation, are alſo called *foreigners*, to diſtinguiſh them from the members of the ſame.

FOREJUDGER, in Engliſh law, ſignifies a judgment whereby one is deprived or put by a thing in queſtion.

To be *forejudged the court*, is where an officer or attorney of any court is expelled the ſame for malpractice, or for not appearing to an action on a bill filed againſt him, &c. And where an attorney of the common-pleas is ſued, the plaintiff's attorney delivers the bill to one of the criers of the court, who calls the attorney defendant, and ſolemnly proclaims aloud, that if he does not appear thereto, he will be forejudged: likewiſe a rule is given by the ſecondary for his appearance; and if the attorney appears not in four days, then the clerk of the warrants ſtrikes ſuch an attorney off the roll of attorneys; after which he becomes liable to be arreſted like any other perſon; but where an attorney is forejudged, he may be reſtored on clearing himſelf from his contumacy, and making ſatisfaction to the plaintiff, &c.

FORELAND, or FORENESS, in navigation, a point of land jutting out into the ſea.

North FORELAND, in the iſle of Thannet, Kent, of which it is the N. E. point is the promontory aſcertained by act of parliament to be the moſt ſouthern part of the port of London, which is thereby extended N. in a right line to the point called the Naſe on the coaſt of Eſſex, and forms that properly called the Mouth of the Thames. A ſea mark was erected here by the Trinity-Houſe corporation at the public expence which is a round brick-tower near 80 feet high. The ſea gains ſo much upon the land here by the winds at S. W. that within the memory of ſome that are living above 30 acres of land have been loſt in one place. All veſſels that paſs on the ſouth-ſide of this head land are ſaid to enter the Channel, which is the name for the narrow ſea between England and France: and all the towns and harbours between London and this place, whether on the Kentiſh or Eſſex ſhore, are called members of the port of London.

South FORELAND, in Kent, a head of land forming the eaſt point of the Kentiſh ſhore: and called *South*, in reſpect to its bearing from the other Foreland, which is about ſix miles to the north. Its ſituation is of great ſecurity to the Downs, the road between both, which would be a very dangerous road for ſhips, did not this point break the ſea off, that would otherwiſe come rolling up from the weſt to the Flats or bank of ſands, which for three leagues together and at about a league or a league and a half from the ſhore run parallel with it and are dry at low water: ſo that thoſe two capes breaking all the force of the ſea on the S. E. and S. W. make the Downs accounted a good road, except when the wind blows exceſſive hard from S. E. E. by N. or E. N. E. when ſhips in the Downs are driven from their anchors, and often run a-ſhore, or are forced on the ſands, or into Sandwich bay or Ramſgate pier.

FORE-ROCKS, in the ſea-language, little flat wedges made with iron, uſed at the ends of bolts, to keep them from flying out of their holes.

FORE-MAST of a Ship, a large round piece of timber, placed in the fore-part or fore-caſtle, and carrying the fore-ſail and fore-top-ſail yards. Its length is uſually $\frac{8}{9}$ of the main-maſt, and the fore-top-gallant-maſt is $\frac{1}{2}$ the length of the fore-top.

Foremast-Men, are thoſe on board a ſhip that take in the top ſails, fling the yards, furl the ſails, bowſe, trice, and take their turn at the helm, &c.

FOREST, in geography, a huge wood: or, a large extent of ground covered with trees. The word is formed of the Latin *foreſta*, which firſt occurs in the capitulars of Charlemagne, and which itſelf is derived from the German *froſt*, ſignifying the ſame thing. Spelman derives it from the Latin *foris reſtat*, by reaſon foreſts are out of towns. Others derive *foreſta* from *feris*, q. d. *Foreſta, quoad ſit tuta ſtatio ferarum*, as being a ſafe ſtation or abode for wild beaſts.

The Caledonian and Hercynian foreſts are famous in hiſtory. The firſt was a celebrated retreat of the ancient Picts and Scots; the latter anciently occupied the greateſt part of Europe; particularly Germany, Poland, Hungary, &c. In Cæſar's time it extended from the borders of Alſatia and Switzerland to Tranſylvania; and was computed 60 days journey long and 9 broad: ſome parts or cantons thereof are ſtill remaining.

The ancients adored foreſts, and imagined a great part of their gods to reſide therein; temples were frequently built in the thickeſt foreſts; the gloom and ſilence whereof naturally inſpire ſentiments of devotion, and turn mens thoughts within themſelves.

For The like reaſon the Druids made foreſts the place of their reſidence, performed their ſacrifices, inſtructed their youth, and gave laws therein.

Forest, in law, is defined, by Manwood, a certain territory of woody grounds and fruitful paſtures, privileged for wild beaſts and fowls of foreſt, chaſe, and warren, to reſt and abide under the protection of the king, for his princely delight: bounded with unremoveable marks and meres, either known by matter of record or preſcription; repleniſhed with wild beaſts of venery or chaſe, with great coverts of vert for the ſaid beaſts; for preſervation and continuance whereof, the vert and veniſon, there are certain particular laws, privileges, and officers.

Foreſts are of ſuch antiquity in England, that excepting the New-Foreſt in Hampſhire, erected by William the Conqueror, and Hampton Court, erected by Henry VIII. it is ſaid that there is no record or hiſtory which makes any certain mention of their erection, though they are mentioned by ſeveral writers and in ſeveral laws and ſtatutes. Ancient hiſtorians tell us, "that New-foreſt was raiſed by the deſtruction of 22 pariſh-churches, and many villages, chapels, and manors, for the ſpace of 30 miles together, which was attended with divers judgments on the poſterity of William I. who erected it: for William Rufus was there ſhot with an arrow, and before him Richard the brother of Henry I.; and Henry nephew to Robert, the eldeſt ſon of the Conqueror, did hang by the hair of the head in the boughs of the foreſt, like unto Abſalom." *Blount.*

Beſides the New-foreſt, there are 68 other foreſts in England, 13 chaſes, and more than 700 parks; the four principal foreſts are New-foreſt on the ſea, Shirewood-foreſt on the Trent, Dean-foreſt on the Severn, and Windſor-foreſt on the Thames.

A foreſt in the hands of a ſubject is properly the ſame thing with a Chase: being ſubject to the common law, and not to the foreſt laws. But a chaſe differs from a foreſt, in that it is incloſed; and likewiſe, that a man may have a chaſe in another man's ground as well as his own; being indeed the liberty of keeping beaſts of chaſe, or royal game therein, protected even from the owner of the land, with a power of hunting them thereon. See Park.

The manner of erecting a foreſt is thus: Certain commiſſioners are appointed under the great ſeal, who view the ground intended for the foreſt, and fence it round; this commiſſion being returned into chancery, the king cauſeth it to be proclaimed throughout the county where the land lieth, that it is a foreſt; and prohibits all perſons from hunting there, without his leave. Though the king may erect a foreſt on his own ground and waſte, he may not do it on the ground of other perſons without their conſent; and agreement with them for that purpoſe ought to be confirmed by parliament.

A foreſt directly taken, cannot be in the hands of any but the king: for no perſon but the king has power to grant a commiſſion to be juſtice in eyre of the foreſt: yet if he grants a foreſt to a ſubject, and that on requeſt made in the chancery, that ſubject and his heirs ſhall have juſtices of the foreſt, in which caſe the ſubject has a foreſt in law.

A ſecond property of a foreſt is, the courts thereof. See *Forest-Court, infra.*

A third property is the officers belonging to it, as the juſtice, warden, verderer, foreſter, agiſtor, regarder, keeper, bailiff, beadle, &c. See the articles Agistor, Bailiff, Forester, &c.

By the laws of the foreſt, the receivers of treſpaſſes in hunting or killing of the deer, if they know them to be the king's property, are principal treſpaſſers. Likewiſe, if a treſpaſs be committed in a foreſt, and the treſpaſſer dies, after his death, it may be puniſhed in the life-time of the heir, contrary to common law. The Norman kings puniſhed ſuch as killed deer in any of their foreſts with great ſeverity; alſo in various manners; as by hanging, loſs of limbs, gelding, and putting out eyes. By *magna charta de foreſta*, it is ordained, that no perſon ſhall loſe life or member for killing the king's deer in foreſts, but ſhall be fined; and if

Foreſt

if the offender has nothing to pay the fine, he ſhall be impriſoned a year and a day, and then be delivered, if he can give ſecurity not to offend for the future, &c. 9 *Hen. III. c.* 1.

Before this ſtatute, it was felony to hunt the king's deer; and by a late act, perſons armed and diſguiſed, appearing in any foreſt, &c. if they hunt, kill, or ſteal any deer, &c. are guilty of felony. 9. *Geo. I. c.* 22.

He who has any licence to hunt in a foreſt or chace, &c. is to take care that he does not exceed his authority; otherwiſe he ſhall be deemed a treſpaſſer from the beginning, and be puniſhed for the fact, as if he had no licence. See further, the articles GAME, and *Game-*LAW.

Beaſts of the foreſt are, the hart, hind, buck, doe, boar, wolf, fox, hare, &c. The ſeaſons for hunting whereof are as follow, *viz.* that of the hart and buck begins at the feaſt of St John Baptiſt, and ends at Holy-rood day; of the hind and doe, begins at Holy rood, and continues till Candlemas; of the boar, from Chriſtmas to Candlemas; of the fox begins at Chriſtmas, and continues till Lady-day; of the hare at Michaelmas, and laſts till Candlemas.

FOREST-Courts, courts inſtituted for the government of the king's foreſts in different parts of the kingdom, and for the puniſhment of all injuries done to the king's deer or veniſon, to the vert or greenſwerd, and to the covert in which ſuch deer are lodged. Theſe are the courts of ATTACHMENTS, of REGARD, of SWEINMOTE, and of JUSTICE-SEAT. 1. The court of attachments, woodmote, or forty-days court, is to be held before the verderors of the foreſt once in every forty days; and is inſtituted to inquire into all offenders againſt vert and veniſon: who may be attached by their bodies, if taken with the mainour (or *mainæuvre, à manu*) that is, in the very act of killing veniſon, or ſtealing wood, or in the preparing ſo to do, or by freſh and immediate purſuit after the act is done; elſe they muſt be attached by their goods. And in this forty-days court the foreſters or keepers are to bring in the attachments, or preſentments *de viridi et venatione*; and the verderors are to receive the ſame, and to enrol them, and to certify them under their ſeals to the court of juſtice-ſeat or ſweinmote: for this court can only enquire of, but not convict, offenders. 2. The court of regard, or ſurvey of dogs, is to be holden every third year for the lawing or expeditation of maſtiffs; which is done by cutting off the claws of the fore-feet, to prevent them from running after deer. No other dogs but maſtiffs are to be thus lawed or expeditated, for none other are permitted to be kept within the precincts of the foreſt: it being ſuppoſed that the keeping of theſe, and theſe only, was neceſſary for the defence of a man's houſe. 3. The court of ſweinmote is to be holden before the verderors, as judges, by the ſteward of the ſweinmote, thrice in every year; the ſweins or freeholders within the foreſt compoſing the jury. The principal juriſdiction of this court is, firſt, to inquire into the oppreſſions and grievances committed by the officers of the foreſt; "*de ſuper-oneratione foreſtarorium, et aliorum miniſtrorum foreſtæ; et de eorum oppreſſionibus populo regis illatis*:" and, ſecondly, to receive and try preſentments certified from the court of attachments againſt offences in vert and veniſon. And this court may not only inquire, but convict alſo; which conviction ſhall be certified to the court of juſtice-ſeat under the ſeals of the jury, for this court cannot proceed to judgement. But the principal court is, 4. The court of juſtice-ſeat, which is held before the chief juſtice in eyre, or chief itinerant judge, *capitalis juſtitiarius in itinere*, or his deputy: to hear and determine all treſpaſſes within the foreſt, and all claims of franchiſes, liberties, and privileges, and all pleas and cauſes whatſoever therein ariſing. It may alſo proceed to try preſentments in the inferior courts of the foreſts, and to give judgment upon conviction of the ſweinmote. And the chief juſtice may therefore, after preſentment made or indictment found, but not before, iſſue his warrant to the officers of the foreſt to apprehend the offenders. It may be held every third year; and 40 days notice ought to be given of its ſitting. This court may fine and impriſon for offences within the foreſt, it being a court of record: and therefore a writ of error lies from hence to the court of king's-bench, to rectify and redreſs any mal-adminiſtration of juſtice; or the chief juſtice in eyre may adjourn any matter of law into the court of king's-bench.

Blackſt Comment.

Foreſt, Fore-ſtaff.

FOREST-Laws, are peculiar laws different from the common law of England. Before the making of *Charta de Foreſta*, in the time of king John and his ſon Henry III. confirmed in parliament by 9 Henry III. offences committed therein were puniſhed at the pleaſure of the king in the ſevereſt manner. By this charter, many foreſts were diſafforeſted and ſtripped of their oppreſſive privileges, and regulations were made for the government of thoſe that remained, particularly, killing the king's deer was made no longer a capital offence, but only puniſhed by fine, impriſonment, or abjuration of the realm: yet even in the charter there were ſome grievous articles, which the clemency of later princes have ſince by ſtatute thought fit to alter *per aſſiſas foreſtæ*. And to this day, in treſpaſſes relating to the foreſt, *voluntas reputabitur pro facto*; ſo that if a man be taken hunting a deer, he may be arreſted as if he had taken a deer.

FOREST-Towns, in geography, certain towns of Suabia in Germany, lying along the Rhine, and the confines of Switzerland, and ſubject to the houſe of Auſtria. Their names are *Rhinefield*; *Seckingen*, *Lauſenburg*, and *Waldſhut*.

FORE-STAFF, an inſtrument uſed at ſea for taking the altitudes of heavenly bodies. The fore-ſtaff, called alſo *croſs-ſtaff*, takes its denomination hence, that the obſerver, in uſing it, turns his face towards the object; in contradiſtinction to the back-ſtaff, where he turns his back to the object.

The fore or croſs ſtaff, repreſented in Plate CXCV. conſiſts of a ſtraight ſquare ſtaff, A B, graduated like a line of tangents and four croſſes or vanes, F F, E E, D D, C C, which ſlide thereon. The firſt and ſhorteſt of theſe vanes, F F, is called the *ten croſs*, or *vane*, and belongs to that ſide of the inſtrument whereon the diviſions begin at three degrees and end at ten. The next longer vane, E E, is called the *thirty croſs*, belonging to that ſide of the ſtaff wherein the diviſions begin at ten degrees and end at thirty, called the *thirty ſcale*. The next vane, D D, is called the *ſixty croſs*, and belongs to the ſide where the diviſions begin at twenty degrees and end at ſixty. The laſt and longeſt, CC, called the *ninety croſs*, belongs to the ſide whereon the diviſions begin at thirty degrees and end at ninety.

The great uſe of this inſtrument is to take the height of the ſun and ſtars, or the diſtance of two ſtars: and the ten, thirty, ſixty, or ninety croſſes, are to be uſed according as the altitude is greater or leſs; that is, if the altitude be leſs than ten degrees, the ten croſs is to be uſed; if above ten, but leſs than thirty, the thirty croſs is to be uſed, &c. *Note*, For altitudes greater than thirty degrees, this inſtrument is not ſo convenient as a quadrant or ſemicircle.

To obſerve an altitude by this inſtrument.—Apply the flat end of the ſtaff to your eye, and look at the upper end of the croſs for the centre of the ſun or ſtar, and at the lower end for the horizon. If you ſee the ſky inſtead of the horizon, ſlide the croſs a little nearer the eye; and if you ſee the ſea inſtead of the horizon, ſlide the croſs farther from the eye: and thus continue moving till you ſee exactly the ſun or ſtar's centre by the top of the croſs, and the horizon by the bottom thereof. Then the degrees and minutes, cut by the inner edge of the croſs upon the ſide of the ſtaff peculiar to the croſs you uſe, give the altitude of the ſun or ſtar.

If it be the meridian altitude you want, continue your obſervation as long as you find the altitude increaſe, ſtill moving the croſs nearer to the eye. By ſubtracting the meridian altitude thus found from 90 degrees, you will have the zenith diſtance. To work accurately, an allowance muſt be made for the height of the eye above the ſurface of the ſea, viz. for one Engliſh foot, 1 minute; for 5 feet, $2\frac{1}{2}$; for 10 feet, $3\frac{1}{2}$; for 20 feet, 5; for 40 feet, 7, &c. Theſe minutes ſubtracted from the altitude obſerved, and added to the zenith diſtance obſerved, give the true altitude and zenith diſtance.

To obſerve the diſtance of two ſtars, or the moon's diſtance from a ſtar, by the fore-ſtaff.—Apply the inſtrument to the eye, and looking to both ends of the croſs, move it nearer or farther from the eye till you ſee the two ſtars, the one on the one end, and the other on the other end, of the croſs; then the degrees and minutes cut by the croſs on the ſide proper to the vane in uſe give the ſtars diſtance.

FORESTALLER, a perſon who is guilty of foreſtalling. See the next article.

FORESTALLING, in law, buying or bargaining for any corn, cattle, victuals, or merchandiſe, in the way as they come to fairs or markets to be ſold, before they get thither, with an intent to ſell the ſame again at a higher price.

The puniſhment in Britain for this offence, upon conviction at the quarter-ſeſſions by two or more witneſſes, is, the firſt time, two months impriſonment and the loſs of the goods, or the value; for the ſecond offence, the offender ſhall be impriſoned ſix months, and loſe double the value of the goods; for the third offence, he ſhall ſuffer impriſonment during the king's pleaſure, forfeit all his goods and chattels, and ſtand on the pillory: but the ſtatute does not extend to maltſters buying barley, or to badgers licenſed.

FORESTER, a ſworn officer of the foreſt, appointed by the king's letters-patent, to walk the foreſt at all hours, and watch over the vert and veniſon; alſo to make attachments and true preſentments of all treſpaſſes committed within the foreſt.

If a man comes in a foreſt in the night, a foreſter cannot lawfully beat him before he makes ſome reſiſtance; but in caſe ſuch a perſon reſiſts the foreſter, he may juſtify a battery. And a foreſter ſhall not be queſtioned for killing a treſpaſſer that, after the peace cried to him, will not ſurrender himſelf, if it be not done on any former malice; though, where treſpaſſers in a foreſt, &c. do kill a perſon that oppoſes them, it is murder in all, becauſe they were engaged in an unlawful act, and therefore malice is implied to the perſon killed.

FORETHOUGHT-FELONY, in Scots law, ſignifies premeditated murder. See MURDER.

FORFAR, a parliament-town of Scotland, and capital of the county of that name, ſituated in N. Lat. 56. 25. W. Long. 2. 32. This town, with Dundee, Cupar, Perth, and St Andrew's, jointly ſend one member to the Britiſh parliament. It ſtands in the great valley of Strathmore that runs from Perth north-eaſt to the ſea, almoſt in a ſtraight line, about 50 miles long and betwixt four and five miles broad, bordered on either ſide by hills, riſing gently on the ſouth ſide, and on the north by the famous Grampians, a little more elevated.

Though hiſtory is ſilent as to the etymology of the name *Forfar*, yet we are ſure it is of very ancient date, and that in the days of old it was the reſidence of royal majeſty. Here Malcom Canmore, a wiſe and magnanimous prince, held his firſt parliament in 1057. The ruins of his palace are ſtill to be ſeen on the top of an artificial mount of a circular form, reſting upon a baſe of about three acres of ground, and riſing 50 feet high above the level of the circumambient plain. A wall of ſtone of a great thickneſs, ſo ſtrongly cemented with run-lime that it is ſcarce poſſible to break the cement with the ſtroke of a hammer, environed the place; and a mote of at leaſt 20 feet broad, and in ſome parts a great deal more, and 12 feet deep, encompaſſed the whole. Adjoining to this is a field of about ſix acres of ground called the *Queen's Manor*, ſurrounded in thoſe days with a large ſheet of water, and acceſſible only by boats. In clearing away ſome of the rubbiſh of the palace a few years ago, a tea-kettle of a conical figure, and a bunch of barbed arrows, were found in the ruins. A pit of about 18 feet deep, very prettily built of hewn ſtone, with a human body in a ſtate of extreme putrefaction, was alſo diſcovered. The lake of Forfar, ſtretching two miles in length from eaſt to weſt, and half a mile in breadth, and covering the palace on the north, afforded not only a plentiful ſupply of water for every purpoſe, but alſo added to the ſtrength of the place. This lake abounds with trout, pike, perch, and eel. Of late years it has been greatly reduced by draining; to which the immenſe quantity of fine marle at the bottom was the principal inducement. This excellent manure is found here in large ſtrata from two to ſix and eight feet deep, and generally below moſs ten feet deep.

This lake has proved fatal to many of the human race; but particularly and deſervedly ſo to the murderers of Malcom II. who having fled after perpetrating the bloody deed at the caſtle of Glammis, about five miles diſtant, in the year 1036, miſſed their way, owing to a deep fall of ſnow, and wandered in the fields for ſome time, till at laſt they came upon the ice on the lake, which not being firm, ſuddenly gave way under them, and they all periſhed. When the thaw came, their bodies were found; and being diſcovered to be the murderers of the king, they were all hung on gibbets on the ſides of the highways.

Within this lake were formerly two iſlands raiſed by art, with buildings on each; to which Margaret, Malcom Canmore's queen, retired after the deceaſe of her huſband. Part of the ruins of theſe edifices are ſtill to be ſeen. To this queen, tradition ſays, we owe the cuſtom of the grace-drink; ſhe having eſtabliſhed it as a rule at her table, that whoever ſtaid till grace was ſaid was rewarded with a bumper.

From this time we have little or no accounts of Forfar till the middle of the 17th century, except an act paſſed in the 13th parliament of James VI. 21ſt July 1593, in the following words: "Our ſoveraine Lorde, underſtanding that be acte and ordinance maid anent obſervation of the Sabbath-daie within this realme, the mercatte-daie of the burgh of Forfare, being the head burgh of the ſchire, quilk was Sundaie, is taken from them; and his hieneſſe not willing that they in onie waies ſuld be prejudged hereby, therefore his hieneſſe, with advice of the eſtaites of this preſent parliament, alteris and changis their ſaid mercatte-daie from Sundaie to Fridaie, and willis the ſamen Friday oukly to be their mercatte-daie to them in all times hereafter; and the ſamen to ſtande with the like priviledges and freedomes as the Sundaie did of before." Whether this change took place, or how long it continued, is uncertain; but the market-day is preſently held on Saturday, and has been ſo paſt memory of man.

During the uſurpation of Oliver Cromwell, a detachment of his forces, after ſacking Dundee, came to Forfar and burnt all the public records of the place; and the only charter the town now has is one granted by Charles II. after his reſtoration, confirming all its ancient rights and privileges.

As an evidence of the ignorance and barbarity of the times, it appears from the records of the trials kept in the charter cheſt of Forfar, that nine perſons were condemned and burnt here for witchcraft betwixt the years 1650 and 1662. Theſe innocent people were all tried by a ſpecial commiſſion from the lords of the privy-council at Edinburgh; and although the commiſſion expreſsly diſcharged torturing them on purpoſe to extort a confeſſion of their guilt, yet, as it was then thought meritorious to obtain confeſſion of guilt by whatever means, many inhuman cruelties were exerciſed upon the unfortunate objects, particularly, an iron boot was drawn upon one of their legs, and a wedge driven with great force between it and the leg. Another inſtrument, ſtill carefully preſerved here, was likewiſe uſed, and is called the *witch-bridle*. It is made of iron, in the ſhape of a dog's collar, with two pikes on the inſide, about four inches diſtant, and two and a half long. Theſe pikes were put into the mouth, and the collar afterwards buckled ſtrait on the back of the head, to which was affixed an iron chain, whereby the condemned perſons were led to the place of execution called the *Play-Field*, about a quarter of a mile to the northward of the town.

The inhabitants of Forfar are a hoſpitable, free, and generous ſet of people: they are at leaſt doubled in number within theſe 30 years, being now about 3300, the houſes have alſo increaſed more in proportion, beſides being vaſtly improved. The church here has juſt been rebuilt on an elegant and extenſive plan calculated to contain 2000 hearers.

Forfar Shire, a county of Scotland, of which Forfar is the capital. Including Angus, Glenila, Gleneſk, and Glenpraſſin, it extends 29 miles from eaſt to weſt, and 16 where broadeſt, though in ſome places the breadth does not exceed five miles. On the north it is divided from the Brae of Mar by a ridge of the Binchinin mountains; it is bounded on the ſouth by the Frith of Tay and the Britiſh ocean, on the eaſt by Mearns, and on the weſt by Perthſhire. Part of the Grampian mountains runs through this county, which is agreeably diverſified with hill and dale. It produces lead and iron in abundance, together with quarries of freeſtone and ſlate, with which the inhabitants drive a conſiderable traffic. The county is well watered with lakes, rivers, rivulets, and fountains, ſhaded with large foreſts, roughened with brown mountains, and waved with green hills interſperſed with fields and meadows, and adorned with fine ſeats and plantations. Their heaths and woods abound with hart, hind, roebuck and moor game; their ſtreams are ſtocked with trout and ſalmon. Their hills are covered with flocks of ſheep, and their fields afford plentiful harveſts of wheat, and all ſorts of grain. The mountains to the weſt and north are inhabited by Highlanders: but the Lowlanders poſſeſs the towns and champaign country, and are remarkable for their politeneſs and hoſpitality.

FORFEITURE, originally ſignifies a tranſgreſſion, or offence againſt ſome penal law. The word is formed of the baſe Latin *foriſfactura*: whence *forfaitura* and *forfaictura*; and the French *forfait*. *Foriſfactura* comes of *foriſfacere*; which, according to Iſidore, ſignifies to "hurt or offend," *facere contra rationem*, and which is not improbably derived of *foris* "out," and *facere*, "to do," q. d. an action out of rule, or contrary to the rules. Borel will have *forfait* derived from the uſing of force or violence: Lobineau in his gloſſary will have *foriſfacta* properly to ſignify a mulct or amend, not a *forfeit*; which latter he derives from the baſe Britiſh *forfed*, "a penalty."

But, with us, it is more frequently uſed for the effect of ſuch tranſgreſſion; or the loſing ſome right, privilege, eſtate, honour, office, or effects, in conſequence thereof; than for the tranſgreſſion itſelf.

Forfeiture differs from *confiſcation*, in that the former is more general; while confiſcation is particularly applied to ſuch things as become forfeited to the king's exchequer; and goods confiſcated are ſaid to be ſuch as nobody claims.

Forfeitures may be either in *civil* or *criminal* caſes.

I. With reſpect to the firſt, a man that hath an eſtate for life or years, may forfeit it many ways, as well as by treaſon or felony; ſuch as alienation, claiming a greater eſtate than he hath, or affirming the reverſion to be in a ſtranger, &c. When a tenant in tail makes leaſes not warranted by the ſtatute; a copyholder commits waſte, refuſes to pay his rent, or do ſuit of court; and where an eſtate is granted upon condition, on non-performance thereof, &c. they will make a forfeiture.

Entry for a forfeiture ought to be by him who is next in reverſion, or remainder, after the eſtate forfeited. As if tenant for life or years commits a forfeiture, he who has the immediate reverſion or remainder ought to enter; though he has the fee, or only an eſtate-tail.

II. Forfeiture in criminal caſes is twofold; of real, and perſonal eſtates.

1. As to real eſtates, by ATTAINDER in high-treaſon, a man forfeits to the king all his lands and tenements of inheritance, whether fee-ſimple or fee-tail; and all his rights of entry on lands and tenements, which he had at the time of the offence committed, or at any time afterwards, to be for ever veſted in the crown; and alſo the profits of all lands and tenements, which he had in his own right for life or years, ſo long as ſuch intereſt ſhall ſubſiſt. This forfeiture relates backwards to the time of the treaſon committed; ſo as to avoid all intermediate ſales and incumbrances, but not thoſe before the fact: and therefore a wife's jointure is not forfeitable for the treaſon of her huſband; becauſe ſettled upon her previous to the treaſon committed. But her dower is forfeited, by the expreſs proviſion of ſtatute 5 and 6 Edw. VI. c. 11. And yet the huſband ſhall be tenant by the curteſy of the wife's lands, if the wife be attainted of treaſon: for that is not prohibited by the ſtatute. But, though after attainder the forfeiture relates back to the time of the treaſon committed, yet it does not take effect unleſs an attainder be had, of which it is one of the fruits; and therefore, if a traitor dies before judgment pronounced, or is killed in open rebellion, or is hanged by martial law, it works no forfeiture of his land: for he never was attainted of treaſon. But if the chief juſtice of the king's bench (the ſupreme coroner of all England) in perſon, upon the view of the body of him killed in open rebellion, records it and returns the record into his own court, both lands and goods ſhall be forfeited.

Blackſt. Comment.

The natural juſtice of forfeiture or confiſcation of property, for treaſon, is founded on this conſideration: That he who hath thus violated the fundamental principles of government, and broken his part of the original contract between king and people, hath abandoned his connections with ſociety, and hath no longer any right to thoſe advantages which before belonged to him purely as a member of the community; among which *ſocial* advantages, the right of transferring or tranſmitting property to others is one of the chief. Such forfeitures, moreover, whereby his poſterity muſt ſuffer as well as himſelf, will help to reſtrain a man, not only by the ſenſe of his duty, and dread of perſonal puniſhment, but alſo by his paſſions and natural affections; and will intereſt every dependant and relation he has to keep him from offending: according to that beautiful ſentiment of Cicero, "*nec vero me fugit quam ſit acerbum, parentum ſcelera filiorum pænis lui: ſed hoc præclare legibus comparatum eſt, ut caritas liberorum amiciores parentes reipublicæ redderet.*" And therefore Aulus Caſcellius, a Roman lawyer in the time of the triumvirate, uſed to boaſt that he had two reaſons for deſpiſing the power of the tyrants; his old age and his want of children: for children are pledges to the prince of the father's obedience. Yet many nations have thought, that this poſthumous puniſhment ſavours of hardſhip to the innocent; eſpecially for crimes that do not ſtrike at the very root and foundation of ſociety, as treaſon againſt the government expreſsly does. And therefore, although confiſcations were very frequent in the times of the earlier emperors, yet Arcadius and Honorius, in every other inſtance but that of treaſon, thought it more juſt, *ibi eſſe pænam, ubi et noxa eſt*; and ordered, that "*peccata ſuos teneant auctores, nec ulterius progrediatur metus, quam reperiatur delictum:*" and Juſtinian alſo made a law to reſtrain the puniſhment of relations; which directs the forfeiture to go, except in the caſe of *crimen majeſtatis*, to the next of kin to the delinquent. On the other hand, the Macedonian laws extended even the capital puniſhment of treaſon, not only to the children, but to all the relations of the delinquent: and of courſe their eſtates muſt be alſo forfeited, as no man was left to inherit them. And in Germany, by the famous golden bull (copied almoſt *verbatim* from Juſtinian's code), the lives of the ſons of ſuch as conſpire to kill an elector are ſpared, as it is expreſſed, by the emperor's *particular bounty*. But they are deprived of all their effects and right of ſucceſſion, and are rendered incapable of any honour eccleſiaſtical and civil; to the end that, being always poor and neceſſitous, they may for ever be accompanied by the infamy of their father; may languiſh in continual indigence; and may find (ſays this mercileſs edict) their puniſhment in living, and their relief in dying."

In England, forfeiture of lands and tenements to the crown for treaſon is by no means derived from the feodal policy, but was antecedent to the eſtabliſhment of that ſyſtem in that iſland; being tranſmitted from their Saxon anceſtors, and forming a part of the ancient Scandinavian conſtitution. But in certain treaſons relating to the coin (which ſeems rather a ſpecies of the *crimen falſi* than the *crimen læſæ majeſtatis),* it is provided by ſome of the modern ſtatutes which conſtitute the offence, that it ſhall work no forfeiture of lands, ſave only for the life of the offenders; and by all, that it ſhall not deprive the wife of her dower. And, in order to aboliſh ſuch hereditary puniſhment entirely, it was enacted by ſtatute 7 Ann. c. 21. that, after the deceaſe of the late pretender, no attainder for treaſon ſhould extend to the diſinheriting of any heir, nor to the prejudice of any perſon, other than the traitor himſelf. By which the law of forfeitures for high treaſon would by this time have been at an end, had not a ſubſequent ſtatute intervened to give them a longer duration. The hiſtory of this matter is ſomewhat ſingular, and worthy obſervation. At the time of the union, the crime of treaſon in Scotland was, by the Scots law, in many reſpects different from that of treaſon in England; and particularly in its conſequence of forfeitures of entailed eſtates, which was more particularly Engliſh; yet it ſeemed neceſſary, that a crime ſo nearly affecting government ſhould, both in its eſſence and conſequences, be put upon the ſame footing in both parts of the united kingdoms. In new-modelling theſe laws, the Scots nation and the Engliſh houſe of commons ſtruggled hard, partly to maintain. and partly to acquire, a total immunity from forfeiture and corruption of blood: which the houſe of lords as firmly reſiſted. At length a compromiſe was agreed to, which is eſtabliſhed by this ſtatute, *viz.* that the ſame crimes, and no other, ſhould be treaſon in Scotland that are ſo in England; and that the Engliſh forfeitures and corruption of blood ſhould take place in Scotland till the death of the then pretender, and then ceaſe throughout the whole of Great Britain: the lords artfully propoſed this temporary clauſe, in hopes (it is ſaid) that the prudence of ſucceeding parliaments would make it perpetual. This has partly been done by the ſtatute 17 Geo. II. c. 39. (made in the year preceding the late rebellion), the operation of theſe indemnifying clauſes being thereby ſtill farther ſuſpended till the death of the ſon of the pretender.

In petit treaſon and felony, the offender alſo forfeits all his chattel intereſts abſolutely, and the profits of all freehold eſtates during life; and after his death all his lands and tenements in fee ſimple (but not thoſe in tail) to the crown, for a very ſhort period of time: for the king ſhall have them for a year and a day and may commit therein what waſte he pleaſes; which is called the king's *year, day* and *waſte*, Formerly the king had only a liberty of committing waſte on the lands of felons, by pulling down their houſes, extirpating their gardens, plowing their meadows, and cutting down their woods. And a puniſhment of a ſimilar ſpirit appears to have obtained in the oriental countries from the decrees of Nebuchadnezzar and Cyrus in the books of Daniel and Ezra; which, beſides the pain of death inflicted on the delinquents there ſpecified, ordain, "that their houſes ſhall be made a dunghill." But this tending greatly to the prejudice of the public, it was agreed in the reign of Henry I. in England, that the king ſhould have the profits of the land for one year and a day in lieu of the deſtruction he was otherwiſe at liberty to commit: and therefore *magna charta*, provides, that the king ſhall only hold ſuch lands for a year and a day, and then reſtore them to the lord of the fee, without any mention made of waſte. But the ſtatue 17 Edw. II. *de prerogativa regis*, ſeems to ſuppoſe, that the king ſhall have his year, day, *and* waſte; and not the year and day *inſtead of* waſte: which Sir Edward Coke (and the author of the Mirror before him) very juſtly look upon as an encroachment, though a very ancient one, of the royal prerogative. The year, day, and waſte, are now uſually compounded for; but otherwiſe they regularly belong to the crown; and after their expiration the land would naturally have deſcended to the heir (as in gavelkind tenure it ſtill does), did not its feodal quality intercept ſuch deſcent, and give it by way of eſcheat to the lord. Theſe forfeitures for felony do alſo ariſe only upon attainder: and therefore a *felo de ſe* forfeits no lands of inheritance or freehold, for he never is attainted as a felon. They likewiſe relate back to the time the offence was committed as well as forfeitures for treaſon, ſo as to avoid all intermediate charges and conveyances. This may be hard upon ſuch as have unwarily engaged with the offender: but the cruelty and reproach muſt lie on the part, not of the law, but of the criminal; who has thus knowingly and diſhoneſtly involved others in his own calamities.

2. The forfeiture of goods and chattels accrues in every one of the high kinds of offence; in high treaſon, or miſpriſion thereof, petit treaſon, felonies of all ſorts whether clergyable or not, ſelf-murder or felony *de ſe*, petty larceny, ſtanding mute, &c. For flight alſo, on an accuſation of treaſon, felony, or even petit larceny, whether the party be found guilty or acquitted, if the jury find the flight, the party ſhall forfeit his goods and chattels: for the very flight is an offence, carrying with it a ſtrong preſumption of guilt, and is at leaſt an endeavour to elude and ſtifle the courſe of juſtice preſcribed by the law. But the jury very ſeldom find the flight; forfeiture being looked upon, ſince the vaſt increaſe of perſonal property of late years, as too large a penalty for an offence to which a man is prompted by the natural love of liberty.

There is a remarkable difference or two between the forfeiture of lands and of goods and chattels. (1.) Lands are forfeited upon *attainder*, and not before: goods and chattels are forfeited by *conviction*. Becauſe in many of the caſes where goods are forfeited, there never is any attainder; which happens only where judgment of death or outlawry is given; therefore, in thoſe caſes the forfeiture muſt be upon conviction, or not at all; and being neceſſarily upon conviction in thoſe, it is ſo ordered in all other caſes, for the law loves uniformity. (2). The forfeiture of lands has relation to the time the fact was committed, ſo as to avoid all ſubſequent ſales and incumbrances; but the forfeiture of goods and chattels has no relation backwards; ſo that thoſe only which a man has at the time of conviction ſhall be forfeited. Therefore a traitor or felon may *bona fide* ſell any of his chattels, real or perſonal, for the ſuſtenance of himſelf and family between the fact and conviction: for perſonal property is of ſo fluctuating a nature, that it paſſes through many hands in a ſhort time: and no buyer could be ſafe, if he were liable to return the goods which he had fairly bought, provided any of the prior vendors had committed a treaſon or felony. Yet if they be colluſively and not *bona fide* parted with, merely to defraud the crown, the law (and particularly the ſtatute 13 Eliz. c. 5.) will reach them; for they are all the while truly and ſubſtantially the goods of the offender: and as he, if acquitted, might recover them himſelf, as not parted with for a good conſideration; ſo, in caſe he happens to be convicted, the law will recover them for the king.

FORFEX, in Roman antiquity, was a way of drawing up an army in the form of a pair of ſheers. It was intended to receive the *cuneus* or wedge, if the enemy ſhould make uſe of that figure. For when the forfex opened to admit the wedge, they had an opportunity of defeating their deſign, and cutting them in pieces.

FORFICULA, the EAR-WIG, in zoology, a genus of inſects belonging to the order of coleoptera. The antennæ are briſtly; the elytra are dimidiated; the wings are covered; and the tail is forked. There are two ſpecies, *viz.* the auricularia, or common ear-wig, with the tops of the elytra white; and the minor, with teſtaceous and unſpotted elytra.—This genus of inſects is one of the beſt known, the forceps at the extremity of their abdomen forming a very diſtinctive character. It is this ſeeming weapon that has occaſioned thoſe inſects to be called *forficulæ* in Latin: and the formidable name of *ear-wigs* has been given them in Engliſh, from a notion that the inſect frequently introduces itſelf into the ears, cauſing great pain and even death. Mr Barbut, however, aſſures us, that the forceps which the ear-wig carries at his tail, and with which he ſeems provided for his defence, is not ſo formidable as it at firſt appears, being deſtitute of ſtrength ſufficient to produce the leaſt ſenſible impreſſion. The larva of the ear-wig differs very little from the perfect inſect.

Ear-wigs are very miſchievous vermin in gardens, eſpecially where carnations are preſerved; for they are ſo fond of theſe flowers, that if care is not taken to prevent them, they will entirely deſtroy them, by eating off the ſweet part at the bottom of the petals or leaves. To prevent which, moſt people have ſtands erected, which have a baſon of earth or lead round each ſupporter, which is conſtantly kept filled with water. Others hang the hollow claws of crabs and lobſters upon ſticks in divers parts of the garden into which thoſe vermin get; and by often ſearching them, you will deſtroy them without much trouble, which will be of great ſervice to your wall-fruit, for theſe are great deſtroyers alſo of all ſoft fruits.

FORGE, properly ſignifies a little furnace, wherein ſmiths and other artificers of iron or ſteel, &c. heat their metals red-hot, in order to ſoften them and render them more malleable and manageable on the anvil.

An ordinary forge is nothing but a pair of bellows, the nozzle of which is directed upon a ſmooth area, on which coals are placed. The nozzle of a pair of bellows may be alſo directed to the bottom of any furnace, to excite the combuſtion of the coals placed there, by which a kind of forge is formed. In laboratories there is generally a ſmall furnace conſiſting of one cylindrical piece, open at top, which has at its lower ſide a hole for receiving the nozzle of a double bellows. This kind of forge-furnace is very convenient for fuſions, as the operation is quickly performed, and with few coals. In its lower part, two inches above the hole for receiving the nozzle of the bellows, may be placed an iron-plate of the ſame diameter, ſupported upon two horizontal bars, and pierced near its circumference with four holes diametrically oppoſite to each other. By this diſpoſition, the wind of the bellows, puſhed forcibly under this plate, enters at theſe four holes; and thus the heat of the fire is equally diſtributed, and the crucible in the furnace is equally ſurrounded by it. This contrivance is uſed in the forge-furnaces for melting copper with this difference only, that theſe furnaces are ſquare, which is a matter of no conſequence.

As the wind of bellows ſtrongly and rapidly excites the action of the fire, a forge is very convenient when a great heat is to be applied quickly; but it is not ſuitable when the heat is to be gradually increaſed.

The forge, or blaſt of bellows, is uſed in ſeveral operations in ſmall; as to fuſe ſalts, metals, ores, &c. It is alſo much uſed in works in the great, which require ſtrong heat, without much management; and chiefly in the ſmelting of ores, and fuſion of metallic matters.

Forge is alſo uſed for a large furnace, wherein iron-ore, taken out of the mine, is melted down: or it is more properly applied to another kind of furnace, wherein the iron-ore melted down and ſeparated in a former furnace, and then caſt into ſows and pigs, is heated and fuſed over again, and beaten afterwards with large hammers, and thus rendered more ſoft, pure, ductile, and fit for uſe.

Forge, in the train of artillery, is generally called a *travelling forge*, and may not improperly be called a portable ſmith's ſhop: at this forge all manner of ſmith's work is made, and it can be uſed upon a march as well as in camp. Formerly they were very ill contrived, with 2 wheels only, and wooden ſupporters to prop the forge for working when in the park. Of late years they are made with 4 wheels, which anſwers their purpoſe much better.

Forge for red-hot Balls, is a place where the balls are made red-hot before they are fired off: it is built about five or ſix feet below the ſurface of the ground, of ſtrong brick-work, and an iron grate, upon which the balls are laid, with a very large fire under them.

FORGER, in law, one guilty of Forgery.

FORGERY (from the French *forger*, i. e. *accudare, fabricare*, "to beat on an anvil, forge, or form,") may be defined at common law, to be "the fraudulent making or alteration of a writing to the prejudice of another man's right:" for which the offender may ſuffer fine, impriſonment, and pillory. And alſo, by a variety of ſtatutes a more ſevere puniſhment is inflicted on the offender in many particular caſes, which are ſo multiplied of late as almoſt to become general. We ſhall mention the principal inſtances.

By ſtatute 5 Eliz. c. 14. to forge or make, or knowingly to publiſh or give in evidence, any forged deed, court-roll, or will, with intent to affect the right of real property, either freehold or copyhold, is puniſhed by a forfeiture to the party grieved of double coſts and damages; by ſtanding in the pillory, and having both his ears cut off, and his noſtrils ſlit, and ſeared; by forfeiture to the crown of the profits of his lands, and by perpetual impriſonment. For any forgery relating to a term of years or annuity, bond, obligation, acquittance, releaſe or diſcharge of any debt or demand of any perſonal chattels, the ſame forfeiture is given to the party grieved; and on the offender is inflicted the pillory, loſs of one of his ears, and half a year's impriſonment: the ſecond offence, in both caſes, being felony without benefit of clergy.

Beſides this general act, a multitude of others, ſince the revolution (when paper-credit was firſt eſtabliſhed), have inflicted capital puniſhment on the forging, altering, or uttering as true when forged, of any bank, bills, or notes, or other ſecurities; of bills of credit iſſued from the exchequer; of ſouth-ſea bonds, &c.; of lottery tickets or orders; of army or navy debentures; of Eaſt-India bonds; of writings under ſeal of the London or royal-exchange aſſurance; of the hand of the receiver of the pre-fines, or of the accountant-general and certain other officers of the court of chancery; of a letter of attorney or other power to receive or transfer ſtock or annuities; and on the perſonating a proprietor thereof, to receive or transfer ſuch annuities, ſtock, or dividends: alſo on the perſonating, or procuring to be perſonated, any ſeaman or other perſon, intitled to wages or other naval emoluments, or any of his perſonal repreſentatives; and the taking, or procuring to be taken, any falſe oath in order to obtain a probate or letters of adminiſtration, in order to receive ſuch payments; and the forging, or procuring to be forged, and likewiſe the uttering or publiſhing, as true of any counterfeited ſeaman's will or power: to which may be added, though not ſtrictly reducible to this head, the counterfeiting of Mediterranean paſſes, under the hands of the lords of the admiralty, to protect one from the piratical ſtates of Barbary; the forging or imitating of any ſtamps to defraud the public revenue: and the forging of any marriage regiſter or licence: all which are, by diſtinct acts of parliament,

liament, made felonies without benefit of clergy. By ſtatutes 13 Geo. III. c. 52. & 59. forging or counterfeiting any ſtamp or mark to denote the ſtandard of gold and ſilver plate, and certain other offences of the like tendency, are puniſhed with tranſportation for 14 years. By ſtatute 12 Geo. III. c. 48. certain frauds on the ſtamp-duties, therein deſcribed, principally by uſing the ſame ſtamps more than once, are made ſingle felony, and liable to tranſportation for ſeven years. And the ſame puniſhment is inflicted by ſtatute 13 Geo. III. c. 38. on ſuch as counterfeit the common ſeal of the corporation for manufacturing plate-glaſs (thereby erected), or knowingly demand money of the company by virtue of any writing under ſuch counterfeit ſeal.

There are alſo two general laws, with regard to forgery; the one 2 Geo. II. c. 25. whereby the firſt offence in forging or procuring to be forged, acting or aſſiſting therein, or uttering or publiſhing as true, any forged deed, will, bond, writing obligatory, bill of exchange, promiſſory note, endorſement or aſſignment thereof, or any acquittance or receipt for money or goods, with intention to defraud any perſon (or corporation), is made felony without benefit of clergy. And by ſtatute 7 Geo. II. c. 22. it is equally penal to forge, or cauſe to be forged, or utter as true, a counterfeit acceptance of a bill of exchange, or the number of any accountable receipt for any note, bill, or any other ſecurity for money, or any warrant or order for the payment of money, or delivery of goods. So that, through the number of theſe general and ſpecial proviſions, there is now hardly a caſe poſſible to be conceived, wherein forgery, that tends to defraud, whether in the name of a real or fictitious perſon, is not made a capital crime.

FORGING, in law, the act of FORGERY.

FORGING, in ſmithery, the beating or hammering iron on the anvil, after having firſt made it red hot in the forge, in order to extend it into various forms, and faſhion it into works. See FORGE.

There are two ways of forging and hammering iron. One is by the force of the hand, in which there are uſually ſeveral perſons employed, one of them turning the iron and hammering likewiſe, and the reſt only hammering. The other way is by the force of a water-mill, which raiſes and works ſeveral huge hammers beyond the force of man; under the ſtrokes whereof the workmen preſent large lumps or pieces of iron, which are ſuſtained at one end by the anvils, and at the other by iron-chains faſtened to the cieling of the forge. See MILL.

This laſt way of forging is only uſed in the largeſt works, as anchors for ſhips, &c. which uſually weigh ſeveral thouſand pounds. For the lighter works, a ſingle man ſerves to hold, heat, and turn with one hand, while he hammers with the other.

Each purpoſe the work is deſigned for requires its proper heat; for if it be too cold, it will not feel the weight of the hammer, as the ſmiths call it, when it will not batter under the hammer; and if it be too hot, it will red-ſear, that is, break or crack under the hammer.

The ſeveral degrees of heat the ſmiths give their irons, are, firſt, a blood-red heat; ſecondly, a white-flame-heat; and, thirdly, a ſparkling or welding heat.

FORISFAMILIATION, in laws When a child, upon receiving a portion from his father, or otherwiſe renounces his legal title to any further ſhare of his father's ſucceſſion, he is ſaid to be *foriſfamiliated*.

FORK, a well-known inſtrument, conſiſting of a handle and blade, divided at the end into two or more points or prongs.

The *pitch-fork* is a large utenſil of this conſtruction, employed in hay-making, &c.

The *table fork*, an inſtrument now ſo indiſpenſable, did not come into uſe in England till the reign of James I. as we learn from a remarkable paſſage in Coryat. The reader will probably ſmile at the ſolemn manner in which this important diſcovery or innovation is related: "Here I will mention a thing that might have been ſpoken of before in diſcourſe of the firſt Italian towns. I obſerved a cuſtom in all thoſe Italian cities and townes through which I paſſed, that is not uſed in any other country that I ſaw in my travels, neither do I thinke that any other nation of Chriſtendome doth uſe it, but only Italy. The Italian and alſo moſt ſtrangers that are commonant in Italy, doe always at their meals uſe a little fork when they eat their meate; for while with their knife which they hold in one hand they cut the meate out of the diſh, they faſten the fork which they hold in the other hand upon the ſame diſh, ſo that whatſoever he be that ſitting in the company of any others at meale ſhould unadviſedly touch the diſh of meat with his fingers from which all the table doe cut, he will give occaſion of offence unto the company as having tranſgreſſed the lawes of good manners, in ſo much that for his error he ſhall be at leaſt-brow-beaten if not reprehended in wordes. This form of feeding I underſtand is generally uſed in all parts of Italy, their forkes for the moſt part being made of yronn, ſteele, and ſome of ſilver, but thoſe are uſed only by gentlemen. The reaſon of this their curioſity is, becauſe the Italian cannot by any means indure to have his diſh touched with fingers, ſeeing all mens fingers are not alike cleane. Hereupon I myſelf thought good to imitate the Italian faſhion by this forked cutting of meate, not only while I was in Italy, but alſo in Germany, and often times in England ſince I came home: being once quipped for that frequently uſing my forke, by a certain learned gentleman a familiar friend of mine, Mr Lawrence Whitaker; who in his merry humour doubted not to call me a table *Furcifer*, only for uſing a fork at feeding, but for no other cauſe."

FORLI, an ancient and conſiderable town of Italy, and capital of a territory of the ſame name, in Romagna, with a biſhop's ſee. The public ſtructures are very handſome; and it is ſeated in a fertile, healthy, and pleaſant country, 10 miles ſouth-eaſt of Faenza, and 45 north-eaſt of Florence. E. Long. 12. 1. N. Lat. 44. 28.

FORLORN-HOPE, in the military art, ſignifies men detached from ſeveral regiments, or otherwiſe appointed, to make the firſt attack in day of battle; or, at a ſiege, to ſtorm the counterſcarp, mount the breach, or the like. They are ſo called from the great danger they are unavoidably expoſed to; but the word is old, and begins to be obſolete.

FORM, in phyſics, denotes the manner of being peculiar to each body; or that which conſtitutes it ſuch a particular body, and diſtinguiſhes it from every other. Mr Harris uſes the term *form* likewiſe in another ſenſe, as an efficient animating principle; to which he ſuppoſes Ovid to refer in the firſt lines of his Metamorphoſis,

In nova fert animus mutatas dicere formas
Corpora——

Theſe animating forms are of themſelves no objects either of the ear or of the eye; but their nature or character is underſtood in this, that were they never to exert their proper energies on their proper ſubjects, the marble on which the ſculptor exerciſes his art would remain for ever ſhapeleſs, and the harp from which the harper calls forth ſounds would remain for ever ſilent.

Thus, alſo, the animating form of a natural body is neither its organization nor its figure, nor any other of thoſe inferior forms which make up the ſyſtem of its viſible qualities; but it is the power, which is yet able to produce, preſerve, and employ theſe. It is the power, which firſt moves and then conducts that latent proceſs, by which the acorn becomes an oak, and the embryo becomes a man; by which digeſtion is performed in plants and animals, and, which departing, the body ceaſes to live, and its members putrefy; and by which every being produces another like itſelf, and every ſpecies is continued. In animals, it is that higher faculty, which, by employing the organs of ſenſe, peculiar to them as animals, diſtinguiſhes them as ſenſitive beings from vegetables; and it is alſo that more noble faculty, which by its own divine vigour, unaſſiſted perhaps with organs, makes and denominates him a being intellective and rational. So that Mr Harris reckons two ſorts of forms, thoſe which are paſſive elements, and thoſe which are efficient cauſes. And all of them agree in this, that they give to every being its peculiar and diſtinctive character: and on the whole he concludes, that form appears in part to be an element, and in part an efficient cauſe, *i. e.* a cauſe which aſſociates the conſtituent elements of natural ſubſtance, and which employs them, when aſſociated, according to their various and peculiar characters.

The philoſophers generally allow two principles of bodies: *matter*, as the common baſis or ſubſtratum of all; and *form*, as that which ſpecifies and diſtinguiſhes each; and which, added to a quantity of common matter, determines or denominates it this or that; wood, or fire, or aſhes, &c.

Subſtantial forms ſeem to have been firſt broached by the followers of Ariſtotle, who thought matter, under different modes or modifications, not ſufficient to conſtitute different bodies; but that ſomething ſubſtantial was neceſſary to ſet them at a greater diſtance; and thus introduced ſubſtantial forms, on the footing of ſouls, which ſpecify and diſtinguiſh animals. What led to this erroneous notion was the circumſtances of life and death: For obſerving, that, as ſoon as the ſoul was departed out of a man, all motion, reſpiration, nutrition, &c. immediately ceaſed, they concluded, that all theſe fuctions depended on the ſoul, and conſequently that the ſoul was the form of the animal body, or that which conſtituted it ſuch: that, the ſoul was a ſubſtance, independent of matter, no body doubted; and hence the forms of other bodies were concluded equally ſubſtantial. But to this it is anſwered, that though the ſoul be that by which a man is man, and conſequently is the form of the human body, as human; yet it does not follow, that it is properly the form of this body of ours, as it is a body: nor of the ſeveral parts thereof, conſidered as diſtinct from each other: For thoſe ſeveral parts have their proper forms ſo cloſely connected with their matter, that it remains inſeparable therefrom long after the ſoul has quitted the body: thus, fleſh has the form of fleſh, bone of bone, &c. long after the ſoul is removed as well as before. The truth is, the body does not become incapable of performing its accuſtomed functions becauſe the ſoul has deſerted it; but the ſoul takes its leave, becauſe the body is not in a condition to perform its functions.

The ancient and modern corpuſcular philoſophers, therefore, with the Carteſians, exclude the notion of ſubſtantial forms: and ſhow, by many arguments, that the form is only the modus or manner of the body it is inherent in. And as there are only three primary modes of matter, viz. figure, reſt, or motion, with two others ariſing therefrom, viz. magnitude and ſituation, the form of all bodies they hold to conſiſt therein: and ſuppoſe the variations theſe modes are capable of, ſufficient to preſent all the variety obſervable in bodies.

Forms are uſually diſtinguiſhed into *eſſential* and *accidental*.

Eſſential. Though the five modes abovementoned, generally taken, be adventitious; yet to this or that body, *e. gr.* to fire or water, they are eſſential: thus, it is *accidental* to iron, to have this or that magnitude, figure, or ſituation, ſince it might exiſt in different ones; yet to a knife or hammer, the figure, magnitude, and poſition of parts, which conſtitute it a hammer or knife, are eſſential; and they cannot exiſt or be conceived without them. Hence it is inferred, that though there be no ſubſtantial, there are eſſential, forms, whereby the ſeveral ſpecies of bodies become what they are, and are diſtinguiſhed from all others.

Accidental forms, are thoſe really inherent in bodies, but in ſuch manner as that the body may exiſt in all its perfection without them. Such is whiteneſs in a wall, heat in water, a figure of a man in wax, &c.

FORM is alſo uſed, in a moral ſenſe, for the manner of being or doing a thing according to rules: thus we ſay, a form of government, a form of argument, &c.

FORM, in law, the rules eſtabliſhed and requiſite to be obſerved in legal proceedings—The formal part of the law, or method of proceeding, cannot be altered but by the ſupreme power; for if once theſe outworks were demoliſhed, there would be an inlet to all manner of inovocation in the body of the law itſelf.

FORM, in carpentery, is uſed to denote the long ſeats or benches in the choirs of churches or in ſchools, for the prieſts, prebends, religous, or ſcholars, to ſit on. Du Cange takes the name to be derived from hence, that the backs of the ſeats were anciently enriched with figures of painting and ſculpture, called in Latin *formæ et typi*. In the life of St William of Roſchild, we meet with *forma* as ſignifying a ſeat for an eccleſiaſtic, or religious, in a choir; and in that of St

Lupicin, we have formula in the ſame ſenſe. In the rule of the monaſtery of St Cæſarea, the nun who preſides over the choir is called *primiceria, vel formari.*

At ſchools, the word *form* is frequently applied to what is otherwiſe termed a *claſs*. See Class.

Form alſo denotes the external appearance or ſurface of a body, or the diſpoſition of its parts, as to the length, breadth, and thickneſs.

Form is alſo uſed among mechanics, for a ſort of mould whereon any thing is faſhioned or wrought.

Printers Form, an aſſemblage of letters, words, and lines, ranged in order, and ſo diſpoſed into pages by the compoſitor; from which, by means of ink and a preſs the printed ſheets are drawm.

Every form is incloſed in an iron-chaſe, wherein it is firmly locked by a number of pieces of wood: ſome long and narrow, and others of the form of wedges, There are two forms required for every ſheet, one for each ſide; and each form conſiſts of more or fewer pages according to the ſize of the book.

Hatters Form, is a large block or piece of wood, of a cylindrical figure; the top thereof rounded, and the bottom quite flat. Its uſe is, to mould or faſhion the crown of the hat, after the matter thereof has been beaten and fulled.

Paper-maker's Form, is the frame or mould wherein the ſheets are faſhioned. See Paper.

FORMA pauperis, in law is when the perſon has juſt cauſe of ſuit, but is ſo poor that he cannot defray the uſual charges of ſuing at law or in equity; in which caſe, on making oath that he is not worth L.5 in the world, on all his debts being paid, and producing a certificate from ſome lawyer that he has good cauſe of ſuit, the judge will admit him to ſue in *forma pauperis*; that is, without paying any fee to counſellors, attorneys, or clerk: the ſtatute 11 Hen. VII. c. 12. having enacted, that counſel and attorneys, &c. ſhall be aſſigned to ſuch poor perſons *gratis*. Where it appears that any pauper has ſold or contracted for the benefit of his ſuit whilſt it is depending in court ſuch a cauſe ſhall be thenceforth totally diſmiſſed and a perſon ſuing *in forma pauperis*, ſhall not have a new trial granted him, but is to acquieſce in the judgment of the court.

FORMAL, ſomething belonging to or conſtituting the form of a thing. See Form.

FORMALITY, the quality of a form, or formula, or that which conſtitutes and denominates them ſuch.

Formality, as defined in the ſchools, is any manner wherein a thing is conceived; or a manner in any object, importing a relation to the underſtanding, whereby it may be diſtinguiſhed from another object. Thus, animality and rationality are formalities. The Scottiſts make great uſe of formalities, in oppoſition to the virtuality of the Thomiſts.

Formalities, in matters of law are frequently uſed for the formulas themſelves, or the rules preſcribed for judicary proceeding. In contracts of ſtrict law, all the formalities muſt be ſtrictly obſerved: an omiſſion of the leaſt formality may ruin the whole convention.

The term is alſo uſed for a certain order, or decorum to be obſerved.

FORMAN (Andrew), archbiſhop of St Andrew's, earl of Pittenweem, and of Cottingham in England, one of the lords of the regency appointed by the ſtates during the minority of king James V. of Scotland, legate a-latere, Primate of all the kingdom of Scotland, and archbiſhop of Bourges in France, was deſcended from the family of the Formans of Hutton in the ſhire of Berwick, and is conſidered to have been one of the beſt ſtateſmen of the age in which he lived. He was employed in 1514, along with Robert Blackader archbiſhop of Glaſgow and Patrick earl of Bothwell, to negociate a match between Ja. IV. of Scotland and Margaret eldeſt daughter of Hen. VII. of England: which next year was ratified by the Scottiſh ambaſſadors. He was afterwards frequently employed as Scots ambaſſador to Rome, England, and France upon the moſt important occaſions. In 1514 he was tranſlated from the ſee of Moray, to which he had been appointed in 1502, to that of St Andrew's. During the time of his poſſeſſing the former, he was employed as mediator betwixt Pope Julius II. and Louis XII. of France, who were at that time at variance; and he happily ſucceeded in conciliating the difference. Having taken leave of the Pope, he paſſed through France on his return home, where he was kindly received by the king and queen who beſtowed upon him the biſhopric of Bourges in France, which annually brought him in 400 tons of wine, 10,000 franks of gold, and other ſmaller articles. Beſides all this he was moſt liberally rewarded by Pope Julius; who promoted him to the archbiſhopric of St Andrew's, as has been already mentioned: confered on him the two rich abbeys of Dunfermline and Aberbrothic: and made him his legate a-latere. At that time, however there were two other candidates for the archiepiſcopal ſee. The learned Gavin Douglas biſhop of Dunkeld having been nominated by the queen, had actually taken poſſeſſion of it; but John Hepburn, a bold and factious man, having been preferred by the monks, drove out the officers of Gavin Douglas, and placed a ſtrong garriſon in the caſtle. So great was the power of this man, that when Forman was nominated by the Pope, no perſon could be found who durſt proclaim the bulls for his election. At laſt lord Home, at that time the moſt powerful nobleman in Scotland, was induced, by large promiſes, beſides ſome gifts of great conſequence, among which was the donation of the abbacy of Coldingham to his youngeſt brother David, to undertake the taſk. It was executed at Edinburgh and St Andrew's; to which places lord Home's brother went with 10,000 men; though the doing of it, contrary to Forman's inclination, proved a ſource of much trouble to that nobleman afterwards. The quarrel betwixt Hepburn and Forman, however, was at laſt terminated by the latter ſurrendering the biſhopric of Moray, as well as ſome years revenue of the archbiſhopric itſelf; paying Hepburn alſo 3000 French crowns annually out of his eccleſiaſtical revenues. On the appointment of the duke of Albany to the regecy, Hepburn endeavoured to undermine the primate's credit with that noblemen, by repreſenting him as one who had in a manner collected all the money in the country, and who conſequently might endanger the tranquillity of the kingdom. Theſe inſinuations, however, were but little regarded by the regent: and Forman had the good fortune afterwards to make up a difference between him and the nobility, which was likely to be attended with much bloodſhed. In 1517 the archbiſhop was appointed by the ſtates one of the lords of the regency, on occaſion of the duke of Albany's going to France. We have already mentioned his embaſſy to Pope Julius II. In M'Kenzie's lives we are informed that in the collection of the Letters of the Scottiſh Kings from the year 1505 till the year 1626, in the lawyers library, there is a letter from that pope to king James IV. wherein he not only highly commends Forman, but likewiſe promiſes that at the firſt creation of cardinals he ſhould be made one. This letter is dated the 6th of May 1511: but the pope died before he had an opportunity of performing his promiſe. In the ſame collection there is a letter from the duke of Albany to Leo X. Julius's ſucceſſor, wherein he preſſes the pope to advance him to the dignity of a cardinal promiſed him by his predeceſſor, and to continue him his legate a-latere. Archbiſhop Forman died in 1521, and was buried at Dunfermline. Dempſter ſays that he wrote a book againſt Luther, a book concerning the Stoic Philoſophy, and a collection out of the Decretals.

FORMATION, in philoſophy, an act whereby ſomething is formed or produced.—For the formation of the fœtus in the womb, ſee Anatomy, n° 109, 110.

Formation of Stones. See Stone.

Formation of Metals and Minerals. See Metal and Mineral.

Formation, in grammar, ſignifies the manner of forming one word from another: thus *accountantſhip* is formed from *accountant*, and this laſt from *account*.

FORMEDON, in law, (breve *de forma donationis*), a writ that lies for a perſon who has a right to lands or tenements, by virtue of any entail, ariſing from the ſtatute of Weſtm. 2 Ch. II.

This writ is of three kinds, viz. a deſcender, remainder and reverter. Formedon in *deſcender*, lies where a tenant in tail infeoffs a ſtranger, or is diſſeiſed and dies, and the heir may bring this writ to recover the lands. Formedon in *remainder*, lies where a man gives lands, &c. to a perſon in tail, and for default of iſſue of his body the remainder to another in tail: here if the tenant in tail die without iſſue, and a ſtranger abates and enters into the land, he in remainder ſhall have this writ. Formedon in *reverter*, lies where lands are entailed on certain perſons and their iſſue, with remainder over for want of iſſue: and, on that remainder failing, then to revert to the donor and his heirs: in this caſe, if the tenant in tail dies without iſſue, and alſo be in remainder, the donor and his heirs, to whom the reverſion returns, may have this writ for the recovery of the eſtate, though the ſame be alienated, &c.

FORMIÆ, or Formia, (anc. geog.), a maritime town of the Adjected or New Latium, to the ſouth-eaſt of Cajeta; built by the Lacedæmonians, (Strabo;) called originally *Hormiæ*, on account of its commodious harbour. An ancient municipium. *Formiani* the people who were admitted to the liberty of the city the very year in which Alexandria was built; but not to the right of ſuffrage till a long time after the ſecond Punic war, (Livy). *Formiæ* at this day lies in ruins, near a place now called *Mola*.

FORMICA, or the Ant, in zoology; a genus of inſects belonging to the order of hymenoptera, the characters of which are theſe: there is a ſmall ſcale, betwixt the breaſt and belly and the joint is ſo deep, that the animal appears as if it were almoſt cut thro' the body. The females, and the neuters or working ants which have no ſexual characteriſtics, are furniſhed with a hidden ſting; and both the males and females have wings, but the neuters have none. There are 18 ſpecies moſt of them diſtinguiſhed by their colours.

Plate CXCVI.

Theſe inſects keep together in companies like the bees, and maintain a ſort of republic. Their neſt is not exactly ſquare, but longer one way than the other and in it there are a ſort of paths, which lead to different magazines. Some of the ants are employed in making the ground firm, by mixing it with a ſort of glue, for fear it ſhould crumble and fall down upon them. They may be ſometimes ſeen to gather ſeveral twigs, which ſerve them for rafters, which they place over the paths, to ſupport the covering; they lay others acroſs them, and upon them ruſhes, weeds, and dried graſs, which they heap up into a double declivity, which ſerves to turn off the water from their magazines. Some of theſe ſerve to lay up their proviſions, in and in others they lay their eggs.

As for the proviſions, they lay up every thing that is fit for them to eat; and you may often ſee one loaded with pippin or grain of fruit, another with a dead fly, and ſeveral together with the carcaſe of a may-bug or other inſect. If they meet with any they cannot bring away they eat it upon the ſpot, or at leaſt ſo much of it as may reduce it to a bulk ſmall enough for them to carry. They do not run about where they pleaſe, at all adventures: for ſome of them are ſent abroad to make diſcoveries; and if they bring back news that they have met with a pear, or a ſugar-loaf, or a pot of ſweetmeats, they will run from the bottom of a garden, as high as the third ſtory of a houſe, to come at it. They all follow each other in the ſame path, without wandering to the right or left; but in the fields they are more at their liberty, and are allowed to run about in ſearch of game. There is a ſort of green fly *, that does a great deal of miſchief among the flowers, and which curls up the leaves of peach and pear trees: and theſe are ſurrounded with a ſort of glue, or honey, which the ants hunt after very greedily; for they touch neither the plant nor the flies themſelves. Next to this their greateſt paſſion is to lay up hoards of wheat and other corn; and for fear the corn ſhould ſprout by the moiſture of the ſubterraneous cells, they gnaw off the end which would produce the blade. The ants are often ſeen puſhing along grains of wheat or barley much larger then themſelves. It is remarkable, that if one ant meets another that is loaded, it always gives way to let it paſs freely; or will help it if it be overburdened.

The ant lays eggs in the manner of the common flies; and from theſe eggs are hatched the larvæ, a ſort of ſmall maggots or worms without legs: theſe are ſharp at one end and blunt at the other: and are white, but ſo tranſparent that the inteſtines are ſeen through the ſkin. Theſe, after a ſhort time, change into large white aureliæ, or chryſalids, which are what are uſually called *ants eggs*. That end which is to be the tail is

* The *Aphis*.

the largeſt, and that which is the head is ſomewhat tranſparent. The ants move theſe about at pleaſure with their forceps. It is well known, that when a neſt of theſe creatures is diſturbed, and the aureliæ ſcattered about, the ants are at infinite pains to get together all that are unhurt, and make a neſt for them again: nay, any ants will do this, and thoſe of one neſt will often take care of the aureliæ of another.

The care theſe creatures take of their offſpring is remarkable. Whenever a hill is diſturbed, all the ants are found buſied in conſulting the ſafety, not of themſelves, but of the eggs or thoſe larger bodies incloſing the maggot or young ant; they carry theſe down any way ſo as to get them out of ſight, and will do this over and over as often as they are diſturbed. They carry away the eggs and vermicles together in their confuſion; but, as ſoon as the danger is over, they carefully ſeparate them, and place each ſort in parcels by themſelves under ſhelter of different kinds, and at various depths, according to the different degrees of warmth and coverture the different ſtates require. In the warm ſeaſon of the year, they every morning bring up the *eggs*, as they are uſually called, to the ſurface, or nearly ſo; and from ten in the forenoon to five in the afternoon, or thereabouts, all theſe will be found juſt under the ſurface: and if the hills be examined towards eight in the evening, they will be found to have carried them all down; and if rainy weather be coming on, it will be neceſſary to dig a foot deep or more, in order to find them. All human precautions have not hitherto been able to ſupply that degree of warmth and minute attention which the ants put in practice to forward the inſtant of their laſt metamorphoſis. The inſect, iſſuing forth to a new life, tears its white tranſparent veil; it is then a real ant, deſtitute of wings, if it has no ſex; winged, if it be male or female, always to be known by a ſmall erect ſcale placed on the thread which connects the body and thorax. Ants tranſact their amours in the air. The males, who are much ſmaller, ſeldom frequent the common habitation: but the females much larger, repair to it to depoſit their eggs, which is all the labour they undergo; the winter's cold deſtroys them. As to the males it is uncertain whether they fall victims to the ſeverity of winter, or are made over to the rage of the labouring ants.—Theſe laſt paſs the winter in a torpid ſtate, as ſome other inſects do, till ſpring reſtores them to their wonted activity: they have therefore no ſtores for winter, no conſumption of proviſions. What are commonly ſold in markets for ant's eggs, are grubs newly hatched, of which pheaſants, nightingales, and partridges, are very fond. The chief enemies to ants are the formica leo, magpies, and ſome other birds and beaſts.

In the hotter countries, as Italy, Spain, and the Weſt-Indies, ants are the greateſt peſt of the fields. Trees, which they are ſaid to injure greatly, may be preſerved from them by encompaſſing the ſtem, for four fingers breadth, with a roll of wool, newly pulled from the ſheep's belly; or by laying ſaw-duſt all round the ſtump of it. Some anoint the tree with tar, which has the ſame effect. But whatever harm they may do in paſture-lands, by making up hills for their habitation and imparing or drying up the graſs, their damaging fruit-trees appears to be an unjuſt reproach.—On the contrary, in Switzerland they are made ſubſervient to the deſtruction of caterpillars. This is done be hanging a pouch filled with ants upon a tree; and they, making their eſcape through an aperture contrived on purpoſe, run over the tree without being able to reach down to the ground, becauſe care has been previouſly taken to beſmear the foot of the tree with wet clay or ſoft pitch; in conſequence of which, compelled by hunger, they fall upon the caterpillars and devour them. People pretend to ſay, that ants, taken inwardly, give a ſpring to the urinary ducts and to the organs of generation. The red colour which they communicate to blue paper, when cruſhed upon it, proves that they contain an acid (ſee CHEMISTRY, n° 2d 907).

The large, black, winged ants of America, to avoid the great rains which fall there at particular ſeaſons, make to themſelves large neſts on trees, with a covered way for them to go up and down on the lee-ſide of the tree. Theſe neſts are roundiſh on the outſide, made of light brown earth, plaſtered ſmooth. They are larger than a buſhel; and in the inſide are many ſinuous caverns or lodgings communicating with one another. See Plate CXCVI. A, The ants neſt; B, The tubular paſſage, made of the ſame materials.

As to thoſe inſects called *white ants*, which abound in Africa and the Eaſt-Indies, they belong to a different genus; for which ſee the article TERMES.

FORMICA-Leo, the *Ant-Lion*, in zoology, an inſect ſo called from its devouring great numbers of ants. It is the caterpillar or worm of a fly much reſembling the libellæ or dragon-flies: and feeds chiefly upon ants, from which property it derives its name.

It is ſomewhat of the nature of the ſpider in its way of taking its prey, its manner of ſpinning, and the figure and ſoftneſs of its body. It has, in its general figure, ſomewhat of the appearance of the millepes or wood-louſe, ſo that ſome have miſtaken it at firſt ſight for that animal. It is of a dirty greyiſh colour, marked with ſome black ſpots; and theſe are alſo compoſed of many points when viewed with a microſcope, which make it reſemble a hedge-hog or porcupine. Its body is compoſed of ſeveral ſmall rings, and has thence a wrinkled look. It has ſix legs, four are joined to the breaſt, and the other two to a longer part, which may be taken for its neck. Its head is ſmall and flat, and it has two remarkable horns: theſe are about a ſixth part of an inch long, and as thick as a hair: they are hard, hollow, and hooked at end like the claws of a cat. At the origin of each of theſe horns, it has a clear and bright black eye, which ſees very diſtinctly, and gives the creature notice to eſcape on the ſight of the ſmalleſt object.—This creature is not able to hunt after its prey, nor to deſtroy large inſects; it can only draw into its ſnares ſuch as come near its habitation, and of theſe very few are ſuch as he can manage: all the winged kind are able to eſcape by flight; and the beetle kinds, and others that have hard ſhells upon their bodies, are of no uſe to him, as his horns cannot pierce them. The ſmallneſs of the ant, and the want of wings in the neuters, make them the deſtined prey of this devourer. The manner in which he catches his prey is as follows.

He uſually encamps under an old wall, that he may be ſheltered from the injuries of the weather; and he always chooſes a place where the ſoil is compoſed of a fine dry ſand. In this he makes a pit of the ſhape of a funnel, or an inverted hollow cone. If he intends the pit to be but ſmall, he thruſts down his hinder part into the ſand, and by degrees plunges himſelf backward into it; and when he has got to a certain depth, he toſſes out the looſe ſand which has run down with his head, artfully throwing it off beyond the edges of his pit. Thus he lies at the bottom of a ſmall hollow, which is wideſt at the top, and comes ſloping down to his body.

But if he is to make a larger pit, more pains are required to bring it to perfection. He firſt traces, in the ſurface of the ſand, a large circle, which is the erected baſe or mouth of the pit he is to make in form of an inverted cone. He then buries himſelf in the ſand near the edge of this circle, and carefully throws up the ſand above him, with his head toſſing it out beyond the circumference of the circle. Thus he continues his work, running down backwards in a ſpiral line all the way, and carefully throwing off the ſand from above him, till he is come to the place of his reſt, which is the point or reverted apex of the hollow cone he has formed by his paſſage. The length of his neck, and the flatneſs of his head, gives him a power of uſing the whole as a ſpade, and throwing off the ſand with great eaſe; and his ſtrength in this part is ſo great, that he is able to throw off a quantity of it to ſix inches diſtance. This is a power he exerts oftner, however, in throwing away the remains of the animals he has fed upon, that his den may not become frightful to others of the ſame ſpecies, by ſeeing their fellow carcaſes about it.

When he has finiſhed his pit, he buries himſelf at the bottom of it among the ſand, leaving no part above ground but the tips of his two horns, which he expands to the two ſides of the pit. In this condition he lies and waits for his prey, and never comes up afterwards. When an ant, or any other ſuch creature, chances to walk over the edges of his pit, its ſteps throw down a little of the ſand, which naturally running down to the bottom of the pit, gives the enemy notice of his prey; he then toſſes up the ſand which covers his head, to bury the ant, and bring him down with its returning force to the bottom; and as one ſuch attempt cannot be ſufficient to prevent the ant's eſcape, he throws more and more ſand upon him, till he by degrees brings him down. All the endeavours of the ant to eſcape, when once it is within the verge of the pit, are in vain; for as it attempts to climb, the ſand runs away from under its feet, and it ſinks the lower for every attempt. This motion of the ſand alſo informs the enemy where it is, and directs him to throw up more ſand in the right place; which it does, till the poor ant falls to the bottom between its horns. It then plunges the points deep into the ant's body; and having ſucked all the juice out of the prey, it throws out the empty ſkin as far from the hole as it can. This done, it mounts up the edges of its pit, and if it has ſuffered any injury, repairs it with great care, and immediately buries itſelf again in the centre, to wait for another meal. The horns of this creature are its only organs for receiving nouriſhment; it never brings any animal which it has ſeized near to its head, but always holds it at the tip of the horns. They therefore plainly ſerve as ſyringes, to draw into its ſtomach the juices of the bodies of the inſects it feeds upon: neither is there any mouth or trunk, or any other organ to be diſcovered about its head, which could ſerve the purpoſe of eating; the head ſeeming only intended for throwing away the ſand in forming the pit. The horns of this animal being ſo neceſſary to its life, nature has provided for the reſtoring them in caſe of accidents; and, if cut off, they are found to grow again.

The food this creature procures by its pit can be but little; and as it has no power of catching its prey any other way, its motion being only backwards, and that ſlowly, and by ſmall ſpaces at a time, ſome people have believed its catching now and then an ant by this means was rather for diverſion than hunger. But though the formica-leo will live a long time without food, and even paſs through all its changes when ſhut up in a box, yet it is always ready to eat when food is offered it; it always appears ſtarved and ſmall when kept thus; and if a fly is given it in this hungry ſtate, it will ſo ſuck out all its juices, that the ſhell remaining may be rubbed to powder between the fingers, while the body of the creature that has ſucked it appears remarkably ſwelled and diſtended; ſo that it is plain that the juices of the prey are conveyed into the body of the creature; though it is not eaſy to ſee by what means, the horns not appearing to have any perforation.

When the formica-leo has lived a proper time in this ſtate, it leaves its pit, and is only ſeen drawing lines and traces on the ſurface of the ſand. After this it buries itſelf under the ſurface; and there incloſes itſelf in a fine web, in which it is to paſs its transformation into the winged ſtate. This caſe is made of a ſort of ſilk which the creature ſpins in the manner of the ſpider, and of a quantity of the grains of ſand cemented together by a glutinous humour which flows from its pores. This caſe, however, would be too harſh and coarſe for the body of the creature, and therefore it ſerves only for the outer covering to defend it from injuries; the creature ſpinning one of pure and incomparably fine ſilk, of a beautiful pearl colour, within it, which covers its whole body.

When the creature has lain ſome time in this caſe, it throws off its outer ſkin, with the eyes, the horns, and every other part neceſſary to its life before, and becomes an oblong nymph, in which a careful eye may trace the form of the fly into which it is to be transformed. There may be ſeen, through its tranſparent covering, new eyes, new horns, wings, and all the other parts of the animal in its perfect ſtate. This nymph makes its way about half out of the ſhell, and remains in this condition, but without farther life or motion, till the perfect fly makes its way out at a ſlit in the back. In this laſt ſtate it much reſembles the libellæ or dragon-flies common about the waters. The male couples with the female in this ſtate only; and M. Poupart, to whom the world is obliged for this curious deſcription, is of opinion, that the females lay only one egg; but but this is very different from the courſe of nature in the other animals of the ſame claſs.

When this inſect forms its pit in a bed of pure ſand, it is made and repaired with great eaſe; but where it meets with other ſubſtances among the ſand, the labour becomes greatly the more embarraſſing. If, for inſtance, when the creature has half formed its pit, and then comes to a ſtone of ſome moderate ſize, it does not deſert the work for this, but goes on, intending to remove that impediment at laſt. When the pit is finiſhed, the creature crawls backward up the ſide of the place where the ſtone is, and getting its backſide under it, takes great pains and time to get it on a true poiſe, and then begins to crawl backward with it up the edge to the top of the pit, to get it out of the way. It is a very common thing to ſee a formica-leo in this manner labouring at a ſtone four times as big as its own body; and as it can only move backward, and the poiſe is hard to keep, eſpecially up a ſlope of ſuch crumbly matter as ſand, which moulders away from under its feet, and neceſſarily alters the poſition of its body, the ſtone very frequently falls down when near the verge, and then it is ſure to roll to the bottom. In this caſe the animal attacks it again in the ſame way, and often is not diſcouraged by five or ſix miſcarriages of this kind; but, after all, attempts again, and at length gets it over the verge of the place. When it has done this, it does not leave it there, leſt it ſhould roll in again: but is always at the pains of puſhing it farther on, till it has removed it to a neceſſary diſtance from the edge of the pit.

The common formica-leo moves only backward; but Mr Brouet has obſerved a ſpecies which moves forward in the common way of other animals, and makes no pit of this kind to entrap its prey, but ſeizes other inſects by force.

FORMING is uſed for the act of giving being or birth to any thing.

The word is alſo ſimply uſed for giving the figure to any thing. The potter forms his veſſels as he pleaſes. Geometry teaches how to form all kinds of figures.

It is likewiſe uſed for the producing of a thing: thus, the lineaments of the face began to be formed.

Forming of a Siege, is the making lines of circumvallation to fortify the camp, and diſpoſing things for the attack of a place in form.

They alſo ſay, to form a ſquadron or battalion; meaning, to range the ſoldiers in form of a ſquadron, &c.

Forming the Line, is drawing up infantry, cavalry, and artillery, into line of battle. See Line.

Forming is alſo uſed in grammar, in ſpeaking of certain tenſes of verbs, which are made from others by a change of certain letters. The preſence tenſe is formed from the infinitive. Compound and derivative words alſo and even all that have any etymology, are ſaid to be formed.

FORMOSA, an iſland in the Pacific Ocean, between, 119° and 122° of E. Long. and 22° and 25° N. Lat. about 100 miles eaſt of Canton in China. It is ſubject to the Chineſe; who, however, notwithſtanding its vicinity, did not know of its exiſtence until the year 1430. It is about 85 leagues in length, and 25 in breadth. A long chain of mountains which runs from north to ſouth, divides it into two parts, the eaſtern and weſtern. The Dutch formed an eſtabliſhment in the weſtern part in 1634, and built the fort of Zealand, which ſecured to them the principal port of the iſland; but they were driven from thence in 1659 or 1661 by a celebrated Chineſe pirate, who made himſelf maſter of all the weſtern part, which afterwards ſubmitted in 1682 to the authority of Kang-he emperor of China.

This weſtern part of Formoſa is divided into three diſtinct governments, all ſubordinate to the governor of Tai-ouan, the capital of the iſland, who is himſelf ſubject to the viceroy of the province of Fokien.

This iſland preſents extenſive and fertile plains, watered by a great number of rivulets that fall from the eaſtern mountains. Its air is pure and wholeſome; and the earth produces in abundance corn, rice, and the greater part of other grains. Moſt of the Indian fruits are found here, ſuch as oranges, bananas, pine-apples, guavas, papaws cocoa-nuts; and part of thoſe of Europe, particularly peaches, apricots, figs, raiſins, cheſnuts, pomegranates, water-melons, &c. Tobacco, ſugar, pepper, camphire, and cinnamon, are alſo common. Horſes, ſheep, and goats, are very rare in this iſland: there are even few hogs, although theſe animals abound in China. Domeſtic poultry, ſuch as fowls, geeſe, and ducks, are exceedingly plenty; pheaſants alſo are ſometimes ſeen; and monkeys and ſtags, have multiplied ſo much, that they wander through the country in large flocks.

The inhabitants of Formoſa rear a great number of oxen, which they uſe for riding, for want of horſes and mules. They accuſtom them early to this kind of ſervice, and by daily exerciſe train them to go as well and as expeditiouſly as the beſt horſes. Theſe oxen are furniſhed with a bridle, ſaddle, and crupper. A Chineſe looks as big and proud when mounted in this manner as if he were carried by the fineſt Barbary courſer.

Wholeſome water fit for drinking is the only thing wanting in the iſland of Formoſa. It is very extraordinary, that every kind of water in it is a deadly poiſon to ſtrangers, for which no remedy has hitherto been found. "One of the governor's ſervants," ſays Father de Mailla, "whom I had in my train (a ſtrong and robuſt man, truſting too much to the force of his conſtitution, would not believe what had been told him concerning this water: he drank ſome of it: and died in leſs than five days, after every medicine and antidote had been adminiſtered without ſucceſs. There is none but the water of the capital which can be drunk: the mandarins of the place therefore always took care to tranſport a ſufficiency of it in carts for our uſe." Our author adds, that at the bottom of a mountain a league diſtant from Fong-kan-hien, there is a ſpring that produces a ſtream, the water of which is of a whitiſh blue colour, and ſo noxious, that no one can approach it.

There are few mulberry-trees in Formoſa, conſequently little ſik is made in the conntry. Numerous manufactures however, would ſoon be introduced into it, were the Chineſe permitted indiſcriminately to tranſport themſelves thither, and to form eſtabliſhments in the iſland. Thoſe who go to it muſt be protected by paſſports from the Chineſe mandarins, and theſe paſſports are ſold at a dear rate: ſecurities are beſides required. This is not all: when they arrive, money muſt be given to the mandarins who are appointed to examine thoſe who enter or quit the iſland, and who generally diſcharge this duty with the moſt rigid ſeverity. If they give no preſent, or offer only a trifle they meet with little mercy; and are ſure to be ſent back, whatever paſſport they may have. The Chineſe through policy, connive at theſe exactions, to prevent too great a number of people from emigrating to this iſland, which is rendered a place of great importance by its proximity to China. They fear, and with great reaſon (eſpecially ſince Tartar emperors have been on the throne), that if any revolt ſhould happen in Formoſa, its influence might ſpread and occaſion great diſturbance in the whole empire. On this account, the Tartars keep a garriſon there of 10,000 men; which they take care to change every three years, or even oftener if they judge it neceſſary.

Beſides the capital, the Chineſe have alſo two other cities, and ſome villages, where they inhabit alone; for they do not permit the Indians, who are their ſubjects, to live among them; they ſuffer none to remain but thoſe who are either their ſlaves or domeſtics. Theſe Indians are united into 45 villages; 36 of which lie to the north, and 9 towards the ſouth. The northern villages are very populous, and the houſes are built almoſt after the Chineſe manner. The habitations of the ſouthern iſlanders are only heaps of huts or cottages of earth. In theſe huts they have neither chairs, benches, tables, beds, nor any piece of furniture; the middle part is occupied by a kind of hearth or chimney, raiſed two feet high, and conſtructed of earth, upon which they dreſs their victuals. Their ordinary food is rice, other ſmall grain, and the game which they catch by courſing or kill with their arms. Theſe iſlanders run with ſuch ſurpriſing ſwiftneſs, that they can almoſt outſtrip the fleeteſt grehound. The Chineſe attribute this agility to the precaution they take of confining their knees and reins by a cloſe bandage until the age of 14 or 15. Their favourite arms are lances, which they dart to the diſtance of 60 or 80 feet with the greateſt dexterity and preciſion. They uſe bows and arrows, and can kill a pheaſant on wing with as much certainty as an European ſportſman could with a fuſee. Theſe people are very dirty in their manner of eating. They have neither plates, diſhes, nor ſpoons, nor even the ſmall ſticks uſed in China. Whatever they dreſs is placed on a plain board or mat, and they make uſe of their fingers for conveying it to their mouths. They eat fleſh half raw; and provided it has been only preſented to the fire, it appears to them excellent. Their beds are formed of freſh-gathered leaves. They go almoſt naked, and wear only a piece of cloth which hangs from their girdle to their knees. Thoſe among them who, according to the judgment of the chiefs of the village, have borne away the prize for agility in running or dexterity in the chaſe, obtain the honourable privilege of making on their ſkin, by a very painful operation, ſeveral fantaſtical figures of flowers, trees, and animals. All have the right of blackening their teeth, and of wearing ornaments of bracelets and crowns made of ſhells and cryſtal.

The iſlanders who inhabit the northern part, where the climate is ſomething colder, clothe themſelves with the ſkins of the ſtags which they kill in hunting. They make a kind of dreſs of them without ſleeves, that pretty much reſembles a dalmatic, or veſtment worn at the altar by the Roman clergy. They wear on their heads caps in the form of a cylinder, made of palm-leaves, and ornamented with ſeveral crowns placed one above another, on the top of which they fix plumes compoſed of the feathers of a cock or pheaſant.

The marriage ceremonies of the inhabitants of Formoſa approach near to the ſimple laws of nature. They neither purchaſe, as in China, the women whom they eſpouſe, nor does intereſt ever preſide over their unions. Fathers and mothers are ſcarcely ever conſulted. If a young man has a mind to marry, and has fixed his affection on a young girl, he appears for ſeveral days following near the place where ſhe lives with a muſical inſtrument in his hand. If the young woman is ſatisfied with the figure of her gallant, ſhe comes forth and joins him: they then agree, and ſettle the marriage-contract. After this they give notice to their parents, who prepare a wedding-dinner, which is always given in the houſe where the young woman reſides, and where the bridegroom remains without returning again to his father. The young man afterwards conſiders the houſe of his father-in-law as his own. He becomes the whole ſupport of it, and he has no farther connection with that of his father; like married women in Europe, who generally quit their paternal home in order to live with their huſbands. Theſe iſlanders therefore ſeldom offer up vows for obtaining male children: they prefer daughters, becauſe they procure them ſons-in-law, who become the ſupports of their old age.

Although the Formoſans are entirely ſubjected to the Chineſe, they ſtill preſerve ſome remains of their ancient government. Each village chooſes three or four old men from among thoſe who have the greateſt reputation for probity. By this choice they become the rulers and judges of the reſt of the hamlet. They have the power of finally determining all differences; and if any one ſhould refuſe to abide by their judgement, he would be immediately baniſhed from the village, without hopes of ever being able to re-enter it, and none of the inhabitants would afterwards dare to receive him.

The natives pay in grain the tribute impoſed on them by the Chineſe. To regulate every thing that concerns the laying on and collecting of this impoſt, government have eſtabliſhed a Chineſe in every village, who is obliged to learn the language, and act as interpreter to the mandarins. Theſe interpreters are moſt cruel extortioners to the miſerable people, whom they ought rather to protect: they are ſuch inſatiable leeches, that they can ſcarcely ever be ſatisfied. This daily and domeſtic tyranny has already cauſed the defection of three villages in the ſouthern part of the iſland, where formerly there were twelve. The inhabitants of theſe villages revolted, expelled their interpreters, refuſed to pay tribute any longer to the Chineſe, and have united themſelves to the independent nation in the eaſtern part of the iſland.

It was in the iſland of Formoſa that John Struys affirms to have ſeen with his own eyes a man who had a tail more than a foot in length, covered with red hair, and greatly reſembling that of an ox. This man with a tail ſaid, that his deformity, if it was one, proceeded from the climate, and that all thoſe of the ſouthern part of the iſland were born with tails like his.—But John Struys is the only author who atteſts the exiſtence of this extraordinary race of men; no other writer who has ſpoken of Formoſa makes the leaſt mention of them. Another circumſtance, no leſs ſingular, and which appears to be little better authen-

Formoſa.

ticated, is, that in this iſland women are not permitted to bring forth children before they are 35, although they are at liberty to marry long before that age. Rechteren * thus expreſſes himſelf concerning this ſtrange cuſtom:

* Dutch Eaſt India Company Voyages, vol. v. p. 96.

" When women are firſt married, they bring no children into the world; they muſt, before that is permitted, have attained the age of 35 or 37. When they are big with child, their prieſteſſes pay them a viſit, and tread on their bellies with their feet, if it be neceſſary, and make them miſcarry, with perhaps greater pains than they would have in being brought to bed. It would be not only a ſhame, but an enormous crime, to bring forth a child before the term preſcribed. I have ſeen ſome females who had already deſtroyed the fruit of their womb 15 or 16 times, and who were big for the 17th when it was lawful for them to bring forth a living child."

To our deſcription of Formoſa we ſhall add the following account of the dreadful diſaſter that lately befel this unhappy iſland. The details were conveyed by a letter from Peking, addreſſed to M. Bertin, and dated the 14th of July 1782.

‘ The waters of the ocean have well nigh deprived China of one of its moſt valuable maritime poſſeſſions. The iſland of Tay-ouan, known in Europe by the name of Formoſa, has been almoſt ſwallowed up by them. It has been reported here, that part of the mountain which divides the iſland, has ſunk and diſappeared; that the reſt has been overturned; and that the greater part of the inhabitants have periſhed. Such have been for ſome days the popular reports in this capital. Government, however, has put a ſtop to them, by informing the public of the real truth; ſuch as it has been announced to the emperor by the officers who have this ſmall portion of his territories under their juriſdiction. I cannot do better than tranſcribe what they have written. The diſpatches of the Chineſe officers addreſſed to the emperor, run thus:

" Bechen, governor-general of the provinces of Fokien and Tche-Kyang-ya, viceroy of Fokien, and others, make known to your majeſty the diſaſter that has lately befallen the iſland of Tay-ouan. Mon-ha-hon, and other principal officers of this iſland, have acquainted us, that on the 21ſt of the fourth moon (May 22d, 1782), a moſt furious wind, accompanied with heavy rain and a ſwell of the ſea greater than ever remembered, had kept them under continual apprehenſion of being ſwallowed up by the waves, or buried in the bowels of the earth, from the hour of *yn* until the hour *ouei* (A). This dreadful tempeſt ſeemed to blow at the ſame time from the four cardinal points of the compaſs, and continued with equal violence during the abovementioned time. The buildings where the tribunals were held, the public granaries, the barracks, ſalt warehouſes, and works, have been totally deſtroyed, and every thing they contained is loſt: warehouſes and work-ſhops, as well as private houſes, for the moſt part, preſent nothing but ruins and heaps of rubbiſh. Of 27 ſhips of war which were in the harbour 12 have diſappeared; two others have been daſhed to pieces, and 10 are ſhattered in ſuch a manner that they are rendered entirely unfit for ſervice; other ſmaller veſſels of different ſizes, above 100 in number, have ſhared the ſame fate; eighty have been ſwallowed up; five others, which had juſt taken in a lading of rice for Fokien, have ſunk, and their cargoes, which amounted to 100,000 buſhels, are wholly loſt. With regard to other veſſels, whether ſmall or great, which had not entered the harbour, 10 or 12 of the largeſt are reckoned to have been ſwallowed up; thoſe of inferior ſize, as well as a prodigious number of barks, boats, and other ſmall veſſels of different kinds, have diſappeared, without leaving the leaſt piece of wreck behind them. As the whole iſland has been covered with water, the proviſions have been either ſwept away or ſpoilt, ſo as to render them prejudicial to the health of thoſe who uſe them in their preſent ſtate. The crops are entirely loſt. When we ſhall have been informed of particulars, we ſhall not fail to give your majeſty the earlieſt intelligence of them.—— After having received this letter from Mon-ha-hon, and the other principal officers reſiding at Tay-ouan, I employed the utmoſt diligence to give every aſſiſtance in my power to this unfortunate iſland; and I ordered the travelling commiſſary, and Trey-ouer, general of the province, to get particular information of the number of thoſe who have periſhed, of the houſes deſtroyed, and of the quantity of ſalt and other proviſions that have been loſt: I have likewiſe enjoined them to rebuild with the utmoſt expedition the tribunals, granaries, and other public edifices; to diſpatch proper perſons to ſearch for the veſſels and ſhips that have diſappeared; to repair thoſe which are not altogether unfit for ſervice, and to ſend immediately to the neighbouring countries for ſalt and other neceſſary proviſions; but above all, to aſcertain in the moſt accurate manner the different loſſes ſuſtained by the inhabitants, and the preciſe number of people that have periſhed, in order that I may be able to give the fulleſt information to your majeſty."

‘ The emperor of China cauſed a particular detail of theſe loſſes to be publiſhed, together with the following letter:

" Tchang-yu, &c. Tchem-hoeï-Thon-Tſong-tou of Fokien, and others, have informed me of the diſmal event that hath taken place in the iſland of Tay-ouan, which is a diſtrict of the province of Fokien. They have written to me, that on the 21ſt of the fourth moon. [Here the emperor repeats what is contained in the preceding letter, and continues thus]: I command Tſong-tou to get the beſt information he can of the different loſſes ſuſtained by the inhabitants of the iſland, and to tranſmit the particulars to me, in order that I may give them every aſſiſtance to repair them. My intention is, that all the houſes which have been thrown down ſhall be rebuilt entirely at my expence; that thoſe be repaired which are only damaged; and that proviſions, and every thing which the people ſtand in immediate want of, be ſupplied them. I ſhould feel much pain, were even one among them to be neglected: I therefore recommend the utmoſt di-

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(A) The hours of the Chineſe are double ours: the hour *yn* begins at three in the morning and ends at five; *ouei* begins at three in the afternoon and ends at five.

ligence and ſtricteſt inquiry, as I am deſirous that none of my ſubjects ſhould entertain the leaſt doubt of the tender affection which I have for them; and that they ſhould know that they are all under my eyes, and that I myſelf will provide for their wants. With regard to my ſhips of war, tribunals, and public edifices, let them be reſtored to their former ſtate with money taken from the public treaſury, and let the general account of the whole expence be laid before me."

The miſſionary who ſent this account farther ſays, from theſe letters it evidently appears, that this diſaſter happened in conſequence of an earthquake; but he adds, that the volcano which occaſioned it muſt be at a prodigious depth below the ſea. He does not pretend to give an explanation of it; he is contented with obſerving, that the ſame ſcene ſeems to have paſſed at the iſland of Formoſa as at Lima and Liſbon.

FORMULA, or FORMULARY, a rule or model, or certain terms preſcribed or decreed by authority, for the form and manner of an act, inſtrument, proceeding, or the like.

FORMULA, in church-hiſtory and theology, ſignifies a profeſſion of faith.

FORMULA, in medicine, imports the conſtitution of medicines, either ſimple or compound, both with reſpect to their preſcription and conſiſtence.

FORMULARY, a writing, containing the form or formula of an oath, declaration, atteſtation, or abjuration, &c. to be made on certain occaſions.

There are alſo formularies of devotion, of prayers, &c. Liturgies are formularies of the public ſervice in moſt churches.

FORNACALIA, or FORNICALIA, in Roman antiquity, a feſtival inſtituted by Numa, in honour of Fornax, the goddeſs of ovens; wherein certain cakes were made, and offered in ſacrifice before the ovens.

FORNICATION (*Fornicatio*, from the *fornices* in Rome, where the lewd women proſtituted themſelves for money), is whoredom, or the act of incontinency, between ſingle perſons; for if either of the parties is married, it is *adultery*. Formerly court-leets in England had power to inquire of and puniſh fornication and adultery; in which courts the king had a fine aſſeſſed on the offenders, as appears by the book of Domeſday.

In the year 1650, when the ruling powers found it for their intereſt to put on the ſemblance of a very extraordinary ſtrictneſs and purity of morals, not only inceſt and wilful murder were made capital crimes, but alſo the repeated act of keeping a brothel, or committing fornication, were (upon a ſecond conviction) made felony without benefit of clergy. But, at the reſtoration, when men, from an abhorence of the hypocriſy of the late times, fell into a contrary extreme of licentiouſneſs, it was not thought proper to renew a law of ſuch unfaſhionable rigour. And theſe offences have been ever ſince left to the feeble coercion of the ſpiritual court, according to the rules of the canon law; a law which has treated the offence of incontinence, nay, even adultery itſelf, with a great degree of tenderneſs and lenity; owing perhaps to the conſtrained celibacy of its firſt compilers. The temporal courts therefore take no cogniſance even of the crime of adultery otherwiſe than as a private injury. See ADULTERY.

The evils of fornication, which too many wiſh to conſider as no ſin, may be judged of from the following particulars.

1. The malignity and moral quality of each crime is not to be eſtimated by the particular effect of one offence, or of one perſon's offending, but by the general tendency and conſequence of crimes of the ſame nature. In the preſent caſe, let the libertine conſider and ſay, what would be the conſequence, if the ſame licentiouſneſs in which he indulges were univerſal? or what ſhould hinder its becoming univerſal, if it be innocent or allowable in him?

2. Fornication ſuppoſes proſtitution; and by proſtitution the victims of it are brought to almoſt certain miſery. It is no ſmall quantity of miſery in the aggregate, which, between want, diſeaſe, and inſult, is ſuffered by thoſe outcaſts of human ſociety who infeſt populous cities; the whole of which is a general conſequence of fornication, and to the increaſe and continuance of which every act and inſtance of fornication contributes.

3. Fornication produces habits of ungovernable lewdneſs, which introduce the more aggravated crimes of ſeduction, adultery, violation, &c. The criminal indulgences between the ſexes prepare an eaſy admiſſion for every ſin that ſeeks it; they are, in low life, uſually the firſt ſtage in mens progreſs to the moſt deſperate villainies; and in high life, to that lamented diſſoluteneſs of principle, which manifeſts itſelf in a profligacy of public conduct, and a contempt of the obligations of religion and moral probity.

4. Fornication perpetuates a diſeaſe, which may be accounted one of the ſoreſt maladies of human nature, and the effects of which are ſaid to viſit the conſtitution of even diſtant generations.

The paſſion being natural, proves that it was intended to be gratified; but under what reſtrictions, or whether without any, muſt be collected from different conſiderations.

In the Scriptures, fornication is abſolutely and peremptorily condemned. ‘Out of the heart proceed evil thoughts, murders, adulteries, fornication, thefts, falſe witneſs, blaſphemies; theſe are the things which defile a man.’ Theſe are Chriſt's own words; and one word from him upon the ſubject is final. The apoſtles are more full upon this topic. One well-known paſſage in the Epiſtle to the Hebrews may ſtand in the place of all others; becauſe, admitting the authority by which the apoſtles of Chriſt ſpake and wrote, it is deciſive. ‘Marriage and the bed undefiled is honourable amongſt all men, but whoremongers and adulterers God will judge; which was a great deal to ſay, at a time when it was not agreed even amongſt philoſophers that fornication was a crime.

Upon this ſubject Mr Paley adds the following obſervations*.

“The Scriptures give no ſanction to theſe auſterities which have been ſince impoſed upon the world under the name of Chriſt's religion, as the celibacy of the clergy, the praiſe of perpetual virginity, the *prohibitio concubitus cum gravida uxore*; but with a juſt knowledge of, and regard to the condition and intereſt of the human ſpecies, have provided in the marriage of one man with one woman an adequate gratification for the propenſities of their nature, and have reſtrained them to that gratification.

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* *Moral and Political Philoſophy*, Philadelphia edit. p. 195.

“The avowed toleration, and in ſome countries the licenſing, taxing, and regulating of public brothels, has appeared to the people an authoriſing of fornication, and has contributed, with other cauſes, ſo far to vitiate the public opinion, that there is no practice of which the immorality is ſo little thought of or acknowledged, although there are few in which it can more plainly be made out. The legiſlators who have patronized receptacles of proſtitution ought to have foreſeen this effect, as well as conſidered, that whatever facilitates fornication, diminiſhes marriages. And as to the uſual apology for this relaxed diſcipline, the danger of greater enormities if acceſs to proſtitutes were too ſtrictly watched and prohibited; it will be time enough to look to that, after the laws and the magiſtrates have done their utmoſt. The greateſt vigilance of both will do no more, than oppoſe ſome bounds and ſome difficulties to this intercourſe. And after all, theſe pretended fears are without foundation in experience. The men are in all reſpects the moſt virtuous in countries where the women are moſt chaſte.

“If fornication be criminal, all thoſe incentives which lead to it are acceſſaries to the crime; as laſcivious converſation, whether expreſſed in obſcene or diſguiſed under modeſt phraſes; alſo wanton ſongs, pictures, books; the writing, publiſhing, and circulating of which, whether out of frolic or for ſome pitiful profit, is productive of ſo extenſive a miſchief from ſo mean a temptation, that few crimes within the reach of private wickedneſs have more to anſwer for, or leſs to plead in their excuſe.

“Indecent converſation, and by parity of reaſon all the reſt, are forbidden by St Paul, Eph. iv. 29. ‘Let no corrupt communication proceed out of your mouth; and again, Col. iii. 8. ‘Put filthy communication out of your mouth.’

“The invitation or voluntary admiſſion of impure thoughts, or the ſuffering them to get poſſeſſion of the imagination, falls within the ſame deſcription, and is condemned by Chriſt, Matt. v. 28. ‘Whoſoever looketh on a woman to luſt after her, hath committed adultery with her already in his heart.’ Chriſt, by thus enjoining a regulation of the thought, ſtrikes at the root of the evil.”

FORNIX, in anatomy, is part of the corpus calloſum in the brain; ſo called, becauſe of a diſtant reſemblance it hath to the arches of ancient vaults when viewed in a particular manner.

FORRAGE, in the military art, denotes hay, oats, barley, wheat, graſs, clover, &c. brought into the camp by the troopers, for the ſuſtenance of their horſes.

It is the buſineſs of the quarter-maſter general to appoint the method of forrage, and poſt proper guards for the ſecurity of the foragers.

FORRES, a parliament town of Scotland in the county of Murray, claſſing with Inverneſs, Fortroſe, and Nairn. It is a ſmall well-built town, pleaſantly ſituated on an eminence near the river Findhorn. The country about it has a cheerful appearance, having a few gentlemen's, ſeats, with ſome plantations about them. On a hill weſt of the town are the remains of a caſtle; and a melancholy view of a number of ſand-hills, that now cover that tract of land which was formerly the eſtate of a Mr Cowben in the pariſh of Dyke. This inundation was occaſioned by the influx of the ſea and the violence of the wind. It had been the cuſtom to pull up the bent, a long ſpiry graſs near the ſhore for litter for horſes, by which means the ſand was looſened, and gave way to the violence of the ſea and wind, which carried it over ſeveral thouſand acres of land. The people having being prevented from pulling up any more of the graſs, the progreſs of the ſand is now nearly ſtopped, and the ſea has retired; but the wind has blown ſome of the ſand from the hills over Colonel Grant's land, and deſtroyed near 100 acres. A ſand-bank, which is all dry at low-water, runs out from this place for ſeveral miles into the Murray-Firth. Some of the land, which has been long forſaken by the water is now beginning to be uſeful again, and is turned into grazing land. At Forres, coarſe linen and ſewing thread are made. About a mile from the town, on the left-hand ſide of the road, is a remarkable obeliſk, ſaid to be the moſt ſtately monument of the Gothic kind to be ſeen in Europe. It has been the ſubject of many able pens; but totally overlooked by Dr Johnſon, who ſays, “At Forres, we found good accommodation, but nothing worthy of particular remark.”—It is thus deſcribed by Mr Cordiner, in a letter to Mr Pennant: “In the firſt diviſion, underneath the Gothic ornaments at the top, are nine horſes with their riders, marching forth in order: in the next is a line of warriors on foot, brandiſhing their weapons, and appear to be ſhouting for the battle. The import of the attitudes in the third diviſion is very dubious, their expreſſion indefinite. The figures which form a ſquare in the middle of the column are pretty complex but diſtinct; four ſerjeants with their halberts guard a company, under which are placed ſeveral human heads, which have belonged to dead bodies piled up at the left of the diviſion; one appears in the character of executioner ſevering the head from another body; behind him are three trumpeters ſounding their trumpets, and before him two pair of combatants fighting with ſword and target. A troop of horſe next appears, put to flight by infantry, whoſe firſt line have bows and arrows; the three following, ſwords and targets. In the lowermoſt diviſion now viſible, the horſes ſeem to be ſeized by the victorious party, their riders beheaded, and the head of their chief hung in chains or placed in a frame; the others being thrown together beſide the dead bodies under an arched cover. The greateſt part of the other ſide of the obeliſk, occupied by a ſumptuous croſs, is covered over with an uniform figure, elaborately raiſed and interwoven with great mathematical exactneſs. Under the croſs are two auguſt perſonages, with ſome attendants, much obliterated, but evidently in an attitude of reconciliation; and if the monument was erected in memory of the peace concluded between Malcolm and Canute, upon the final retreat of the Danes, theſe large figures may repreſent the reconciled monarchs. On the edge below the fretwork are ſome rows of figures joined hand-in-hand, which may alſo imply the new degree of confidence and ſecurity which took place, after the feuds were compoſed, which are characterized on the front of the pillar. But to whatever particular tranſaction it may allude, it can hardly be imagined, that in ſo early an age of the arts in Scotland as it muſt have been raiſed, ſo elaborate a performance would have been undertaken but in conſequence of an event of the moſt general importance; it is therefore ſurpriſing, that no diſtincter traditions of it arrived at the era when letters were known. The height of this monumet (called *King Sueno's ſtone*) above the ground is 23 feet; beſides 12 or 15 feet under ground. Its breadth is 3 feet 10 inches by 1 foot 3 inches in thickneſs."

FORSKOHLEA, in botany: A genus of the pentagynia order, belonging to the decandria claſs of plants. The calyx is pentaphyllous, and longer than the corolla. There are ten petals ſpatulated, *i. e.* roundiſh before, with a linear baſe.

FORESTERA, in botany: A genus of the triandria order, belonging to the gynandria claſs of plants. The perianthium is double; the exterior one beneath three leaved; the exterior one above, and ſix-cleft; the corolla tubular.

FORT, in the military art a ſmall fortified place, environed on all ſides with a moat, rampart, and parapet. Its uſe is to ſecure ſome high ground, or the paſſage of a river, to make good an advantageous poſt, to defend the lines and quarters of a ſiege, &c.

Forts are made of different figures and extents, according as the ground requires. Some are fortified with baſtions, others with demi-baſtions. Some again are in form of a ſquare, others of a pentagon. A fort differs from a citadel, as this laſt is built to command ſome town.

Vitrified FORTS, a very ſingular kind of ſtructures found in the highlands and northern parts of Scotland, in which the walls have the appearance of being melted into a ſolid maſs, ſo as to reſemble the lava of a volcano, for which indeed they have been taken by ſeveral perſons who have viſited them.

Theſe walls were taken notice of by Mr Williams an engineer, who wrote a treatiſe upon the ſubject, and was the firſt who ſuppoſed them to be the works of art; other naturaliſts having attributed them to a volcanic origin. Theſe works are commonly ſituated on the tops of ſmall hills, commanding an extenſive view of the adjacent valley or low country. The area on the ſummit, varying, as is ſupoſed, according to the number of cattle the proprietor had to protect, or the dependants he was obliged to accommodate, is ſurrounded with an high and ſtrong wall, of which the ſtones are melted, moſt of them entirely; while others, in which the fuſion has not been ſo complete, are ſunk in the vitrified matter in ſuch a manner as to be quite incloſed with it; and in ſome places the fuſion has been ſo perfect, that the ruins appear like maſſes of coarſe glaſs. Mr Williams has not only abſolutely determined the walls in queſtion to be the works of art, but has even hazarded a conjecture as to the manner in which they were conſtructed, and which, according to him, was as follows. Two parallel dikes of earth or ſod being raiſed, in the direction of the intended wall, with a ſpace between them ſufficient for its thickneſs, the fuel was put in, and ſet on fire. The ſtones beſt adapted for the purpoſe, called the *plum-pudding ſtone*, are every where to be found in the neighbourhood. Theſe were laid on the fuel, and when melted, were kept by the frame of earth from running off; and by repeating the operation, the wall was raiſed to a ſufficient height. This opinion of the ſtones being thrown in without any order, is thought to be confirmed by the circumſtance of there not being any where a large one to be ſeen, nor a ſtone laid in any particular direction, nor one piece which has not in ſome degree been affected by the fire. Mr Williams mentions a fact tending to confirm his hypotheſis, viz. of a brick kiln ſituated on the declivity of an eminence, ſo as to be expoſed to the wind, which happening to riſe briſkly one time when the kiln was burning, ſo increaſed the heat, that the bricks were melted, and ran, like a lava, for a conſiderable way down the hill.

The opinion of Mr Williams has been embraced by ſeveral other authors; particularly Mr Freebairn and Dr Anderſon, the latter having publiſhed two treatiſes upon theſe buildings in the Archæologia. In the ſame work, however, we meet with a paper by the Hon. Daines Barrington, in which the author expreſſes quite different ſentiments. He obſerves, that Mr Williams, and the other antiquaries, who ſuppoſe the walls in queſtion to be the works of art, imagine that the reaſon of their being conſtructed in this manner was the ignorance of cement, which in theſe remote ages prevailed in Scotland: but with reſpect to this circumſtance, he ſays, that if one ſide of the wall only was heated, and that to any conſiderable height, the matter in fuſion would in all likelihood drop down to the bottom, without operating as any cement to the looſe ſtones thrown in amongſt it. This circumſtance of the walls being vitrified only on one ſide, is indeed remarkable, and takes place in moſt of the forts of this kind to be met with at preſent: but with regard to it, Mr Barrington obſerves, that he himſelf has been twice in the Highlands of Scotland, and has found very few hills of any height which were cloathed with wood; the trouble therefore of carrying it up to the top of ſuch a mountain would be very conſiderable. But to this it might eaſily be replied, that we cannot by any means argue from the preſent ſtate of the hills in the Highlands to their ſtate in a very remote period of antiquity. At that time, it is neither impoſſible nor in the leaſt improbable, that moſt of the hills in Scotland were evergrown with wood; or at any rate, there undoubtedly was plenty of peat, which is ſtill uſed as fuel in Scotland, and which affords ſuch a ſtrong heat as to be advantageouſly employed in ſmelting iron*, as we are informed by M. Magellan. A third particular mentioned by Mr Williams is, that theſe incloſures were intended as places of defence; and in ſupport of this opinion alleges, that there are dried wells found within moſt of them. But on this Mr Barrington obſerves, that ſhelter from the weather was alſo neceſſary "upon the top of a bleak Scotch hill, whilſt whiſky (or a ſuccedaneum for it) would be often in greater requeſt than the bare element of water." This objection, however, as well as the laſt, is evidently very frivolous for theſe buildings might have roofs as well as any other; and whatever neceſſity there might be for whiſky occaſionally, water was certainly an indiſpenſable requiſite.

Mr Barrington having thus given his reaſons for diſſenting from the opinion of Mr Williams and the antiquaries juſt mentioned, proceeds to ſtate his own. He tells us, that having travelled for 21 years the moſt mountainous circuit in Wales, he has frequently obſerved incloſures of dry ſtones, particu-

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* See the article *Peat*

larly a long tract in the weſtern part of Merionethſhire, called in the language of the country *Duffryn*, i. e. *the vale*. On firſt viewing theſe ſmall incloſures made with walls of thick ſtones, he was at a loſs to imagine how it could be worth while to conſtruct ſuch ſtrong fences for ſo inconſiderable a piece of ground as they incloſed: but, on examining the adjacent country, he found it almoſt entirely covered with ſtones of a ſimilar kind; and, of conſequence, the ſmaller the ſpace to be cleared, the leſs expenſive would be the removal. "For the ſame reaſon (ſays he), ſuch dry walls are often of a great thickneſs, and ſometimes the corners of the incloſures are filled with ſtones to a great width, this being the only poſſible means of procuring paſture." To a practice of the ſame kind our author would aſcribe the origin of the works in queſtion: but the objection occurs very ſtrongly, that the walls in Scotland, are vitrified, and it is not to be ſuppoſed that ſuch trouble would be taken with fences made in ſuch a fortuitous manner. This objection our author owns, would indeed be unanſwerable, on the ſuppoſition that the vitrification was made on purpoſe to ſtrengthen the walls of the fortreſs; "but (ſays he) may not the vitrification have been occaſioned by volcanoes, or by what are called *bloomeries*? The ſame effect may be produced likewiſe on dry walls of ſtone by lightning paſſing along them. The looſe ſtones in either caſe would not be rejected becauſe they were glaſſy, and would be piled up in the fence of the incloſure; as the great point upon theſe occaſions is to clear the ground, and remove the incumbering ſtones to the ſmalleſt diſtance. One of the advocates for the deſigned and not fortuitous vitrification, ſays, that the pieces he had procured did not reſemble what is called *lava*. But every volcano is not neceſſarily an Etna or a Veſuvius; and conſequently the matter diſgorged from the crater muſt perpetually vary both in ſubſtance and form. Vitrified maſſes, larger or ſmaller, will likewiſe be produced by the ſame means. It may be contended indeed, that paſture thus procured, by clearing the ground, would be more convenient at the bottom or on the ſides, than on the top of the hills: but to this I anſwer, that in rocky countries you muſt get what pittance you can of ſoil, and often it will happen that the only detached and removeable ſtones are on the ſummit. When ſuch incloſures have been made, they became very convenient for putting cattle into; and hence perhaps ſome of the wells which Mr Williams hath mentioned."

Our author concludes his diſſertation on this ſubject by obſerving, that if vitrification anſwered the purpoſe of cement, it is very extraordinary that the ancient ininhabants of Scotland did not apply it to the houſes or huts in which they conſtantly lived, but reſerved this troubleſome and expenſive proceſs merely for a fortification, which might not perhaps be uſed in half a century againſt an enemy. On this it is almoſt ſuperfluous to obſerve that in the ages of barbarity and bloodſhed, in which theſe incloſures, whether natural or artificial, were ſuppoſed to be uſed as fortreſſes, war was ſo frequent, that a defence againſt an enemy might ſeem to be neceſſary every day, inſtead of once in half a century. Before we proceed further in the argument, however, it will be neceſſary to give ſome account of the ſituation and appearance of theſe fortreſſes.

According to Mr Cardonnel, the largeſt of them is ſituated on the hill of Knockfarril, to the ſouth of the valley of Strathpeſſer, two miles weſt from Dingwall in Roſsſhire. The incloſure is 120 feet long and 40 broad within the walls; ſtrengthened on the outſide with works at each end. A range of habitations ſeem to have been erected againſt, or under, the ſhade of the outward wall; of which thoſe on the ſouth-ſide ſeem to have been higher and larger than thoſe on the north. There are two wells in the middle, which, on being cleared out, filled with water. On the ſkirts of the hill to the ſouth are many detached buildings; which, from the ſtratum of dung found on removing the ruins, appears plainly to have been uſed for ſecuring the cattle. This place ſeems to have been anciently of conſequence, and the reſidence of ſome powerful chief, from a road which leads through the hills to the north-weſt ſea. To the eaſt of the works are a number of vitrified ruins, extending for a conſiderable way along the ridge of the hill. The end next the fort ſeems to have joined the outer wall, and conſiſted either of two parallel walls, cloſed above, with a paſſage between them under cover, or a high wall broad enough to walk on. In this wall there is the veſtige of a break about the middle, over which a bridge has been laid, to be drawn up or removed as occaſion might require.

The fort next in conſequence to that of Knockfarril is ſituated on the hill of Craig-Phadrick near Inverneſs, "which (ſays Mr Cardonnel) has this peculiar circumſtance that there appears to have been two vitrified walls quite round the area. The inner one ſeems to have been very high and ſtrong: the outer wall but low: probably the ſpace between was intended for ſecuring their cattle, as there are no remains of dry-ſtone buildings, ſuch as are found near the reſt. Several parts of this outer wall appear quite entire, ſticking to the firm bare rock, where it was firſt run. The area within the inner wall is near 80 paces long, and 27 broad." Of this we have an account † by Alexander Fraſer-Tytler Eſq: profeſſor of civil hiſtory in the univerſity of Edinburgh, who viſited it in the year 1782. The hill itſelf is a ſmall conical eminence, forming the eaſtern extremity of that ridge of mountains which bounds Loch-Neſs on the northweſt ſide. It is ſituated about a mile to the north of Inverneſs, and is acceſſible on two different quarters, viz. the weſt and ſouth-eaſt; the former affording entrance by a narrow level ridge joining the hills on Loch-Neſs, and the latter by an eaſy aſcent from the high ground above Inverneſs. On approaching the hill from the weſt we firſt meet with a road cut through the rock from the bottom to the top, in moſt places 10 feet broad and nearly as deep; winding, for about 70 feet, with an eaſy ſerpentine direction, by which we gain an aſcent over a ſteep rock otherwiſe quite inacceſſible from that quarter. This road in our author's opinion, is undoubtedly the work of art, and the vitrified matter on the top is the only thing which indicates the effect of fire: there being neither an appearance of pumice ſtone, lava, nor baſaltes about the hill otherwiſe. There is indeed plenty of plum-pudding ſtone; which

† *Edin. Phil. Tranſact.* vol. ii. claſs ii. art. II.

which ſome have ſuppoſed to be of the nature of volcanic tufa; but this opinion is rejected by our author as erroneous. "But the circumſtance (ſays he) which in my apprehenſion evinces, in the moſt ſatisfactory manner, that theſe appearances of the effect of fire on the ſummit of this hill are not the operation of nature but of art, is the regular order and diſpoſition of thoſe materials, the form of the ground, and the various traces of ſkill and contrivance which are yet diſcernible, though conſiderably defaced either by external violence or the obliterating hand of time." To inveſtigate this matter regularly, he begins with the winding road already mentioned, and which is evidently cut through the rock for the purpoſe of gaining an eaſy aſcent from the level ridge to the ſummit, which would otherwiſe have been impracticable. In aſcending by this road, there appears towards the middle, on the right hand, a ſmall platform overhanging the paſſage, and inclininig by a very gentle declivity to the very edge of the rock. Four enormous ſtones are placed upon the platform, and on the edge and extremity of it, which have evidently been guided by art into to that poſition: it being impoſſible that they could have reſted there, had they been rolled down from the higher parts. The obvious reaſon for placing them in ſuch a poſition has been, that on an alarm of danger they might be projected into the path below. which could be done by the efforts of a very few men; and when this was done, the paſſage would be entirely obſtructed, or at leaſt rendered ſo difficult that it could be defended by a few againſt any number of aſſailants. Some other large ſtones are placed on an eminence to the left, probably with a view to block up an hollow channel, by which an enemy might have attempted to aſcend. When we come to the top of the hill, a few feet below the rampart which crowns the whole, there appears an outward wall approaching on the ſides of the hill ſo near the upper rampart, as to have only a trench of 10 or 12 feet wide between them. This outward wall is in ſome places ſo low as to be almoſt level with the rock, though in other places it riſes to the height of two or three feet; but even where loweſt, it may be traced by a line of vitrified matter ſticking faſt to the rock all along, and nearly of the ſame breadth, which is about nine feet. The remains of this wall are ſtrongly vitrified, except in one place on the north ſide, where, for about 70 yards, the rampart is formed only of dry ſtones and earth. At the eaſt ſide, where the hill is more acceſſible, there is a prodigious mound of vitrified matter, extending itſelf to the thickneſs of above 40 feet. At the ſouth-eaſt corner and adjoining to this immenſe mound, is an outwork, conſiſting of two ſemicircular vitrified walls with a narrow paſs cut through them in the middle: which appears to have been another, and perhaps the principal, entry to the fort.

The inner wall, ſurrounding the ſummit of the hill, incloſes an oblong level area of about 75 yards long and 30 broad, rounded at each of the ends like the outward wall. It is of conſiderable height, and nearly of the ſame thickneſs with the outward one.—It has ſome appearance of having been defended with four turrets or baſtions: but the traces are ſo imperfect, that Mr Tytler does not lay much ſtreſs on his obſervations in this reſpect; a number of ſmall tumuli of earth with a ſtone in the centre, were more diſcernible. On the eaſt ſide a portion of the internal ſpace appears ſeparted from the reſt by two ranges of ſtones fixed ſtrongly in the earth, and forming a right-angled parallelogram. "This ſeparation (ſays our author) is immediately diſcernible by the eye, from this circumſtance that the whole of the incloſed ſummit has been moſt carefully cleared from ſtones, of which there is not one to be ſeen, unleſs thoſe that form this diviſion, and the ſingle one in the middle of the circle of timuli abovementioned. What has been the deſign of this ſeparated ſpace, it is dfficult to conjecture. It might perhaps have marked the reſidence of thoſe of a higher rank, or ſerved as a temple for the purpoſes of devotion." On the eaſt end of the large area on the ſummit is a well of about ſix feet in diameter, which has probably been ſunk very deep in the rock, though now it is filled up with rubbiſh to within a yard of the top.

The other fortified hills mentioned by Mr Cardonnel are thoſe of Dun-Evan in the ſhire of Nairn; Tordun caſtle, near fort Auguſtus; and another on the weſt ſide of Gleneves in Lochaber, three miles to the ſouth of Fort William. The Caſtle-hill of Finhaven, in the county of Angus, has likewiſe ſome conſiderable ruins of the ſame kind.

Dun-Evan and the hill of Finhaven have likewiſe been viſited by Mr Tytler, who gives an account of them in the paper already quoted; of which the following is an abſtract. "On the ſummit of the hill of Dun-Evan, whoſe name implies that it had been originally a place of defence, are the remains of two walls ſurrounding an oblong ſpace like that of Craig-Phadrick already deſcribed, but ſomewhat ſmaller in ſize. [Mr Cardonnel ſays that it is about 70 paces long and 30 broad]. There are likewiſe the traces of a well in the incloſed area; and at the eaſt end are the remains of a prodigious maſs of building, much more extenſive than that on Craig-Phadrick." Here, however, our author could not perceive any marks of fire; and Mr Williams owns that the vitrified ruins here are more waſted than on Knockfarril or Craig-Phadrick. But with regard to the vitrifications here, our author is inclined to ſuppoſe Mr Williams to have been entirely in a miſtake. On the Caſtle-hill of Finhaven, however, the vitrified remains are very viſible all round the ſummit, which is cleared of ſtones and levelled, unleſs at one end, where there is a great hollow ſpace ſeparated from the reſt of the area, and probably deſtined excluſively for the keeping of cattle. The incloſed area is about 140 yards long and upwards of 40 broad.

Beſides theſe fortifications, the hill of Noth affords a remarkable appearance of the ſame kind: of which Mr Cordiner gives the following deſcription, not from his own obſervation, but thoſe of a gentleman of credit who viſited the place. "On the top of the hill there is an oblong hollow, as I could gueſs, of about an Engliſh acre, covered with a fine ſward of graſs: in the middle toward the eaſt end of this hollow is a large and deep well. The hollow is ſurrounded on all ſides with a thick rampart of ſtones. On three ſides of this rampart, from 8 to 12 feet thick, is one compact body of ſtones and minerals which have been in a ſtate of fuſion, reſembling a mixture of ſtone and iron-ore, all vitrified, calcined, and incorporated. On the north ſide, the rampart conſiſts of broken pieces of rock, which have the appearance of having been torn to pieces by ſome extraordinary violence. If the calcined compact wall exiſts under them, it is not at preſent viſible."

Such are the deſcriptions of the moſt remarkable of theſe curious fortifications, which of late ſeem to have engaged the attention of the learned in a conſiderable degree. We have already taken notice, that by ſome they are ſuppoſed to be the works of art, by others the productions of a volcano. Mr Cardonnel adopts the opinion of Mr Williams as the moſt probable, both with reſpect to their uſe and manner of conſtruction. Mr Tytler takes notice of the remarkable difference of opinion among thoſe who have viewed the places in queſtion. "It is curious to remark (ſays he) how the ſame appearances, to different obſervers, lead to the moſt oppoſite opinions and concluſions. The two gentlemen abovementioned (Mr Willimas and Dr Anderſon), ſeem not to have entertained the ſmalleſt doubt, that the vitrified materials on the tops of theſe hills were the veſtiges of works of art, and the remains of ſtructures reared for the purpoſes of ſecurity and defence. The biſhop of Derry, when on the tour to the north of Scotland, viſited the hill of Craig-Phadrick near Inverneſs, and expreſſed his opinion, that the mounds of vitrified matter were not the remains of any artificial work, but the traces of an ancient volcano. In the Phil. Tranſ. of the Royal Society of London for 1777, Part II. nº 20. is an account of *Creck Paterick*, there termed *a Volcanic hill near Inverneſs*, in a letter from Thomas Weſt, Eſq; to Mr Law, F. R. S. in which the writer does not heſitate to pronounce this hill an extinguiſhed volcano: and having ſent ſpecimens of the burnt matter for the inſpection of the Royal Society, the ſecretary ſubjoins a note to the paper, intimating, that theſe ſpecimens having been examined by ſome of the members well acquainted with volcanic production, were by them judged to be real lava. Such was likewiſe the opinion of the late Andrew Croſbie, Eſq; who, in an account which he gave to the Philoſophical Society of Edinburgh in 1780, offered ſome very curious conjectures with regard to the proceſs of nature, by which he ſuppoſed the whole of this hill to have been thrown up from the bottom of the ſea by the operation of inteſtine fire.

Mr Tytler agrees with thoſe who think the vitrified ſtructures to be artificial works: but he differs from Mr Williams and others, who think that they were vitrified on purpoſe for cementing the materials together. His reaſon for this is, that the number of forts that ſhow marks of vitrification is inconſiderable when compared with thoſe that do not. He therefore conſiders the vitrification as accidental; and that it muſt have been accompliſhed in the following manner. In the rude ſtate in which we muſt ſuppoſe Scotland to have been in early times, is very probable that their buildings, both for habitation and defence, would be frequently conſtructed of looſe ſtones of an irregular ſhape; of which, by themſelves, it would ſcarce be poſſible to fabricate a wall of any tolerable ſtrength. Hence it became neceſſary to uſe wood as well as ſtone in their conſtruction. This kind of building then, in our author's opinion, was begun by raiſing a double row of palliſades or ſtrong ſtakes in the form of the intended ſtructure in the ſame way as in that ancient mode of building deſcribed by Palladio under the name of *riempiuta a caſſa*, or coffer-work. Theſe ſtakes were probably warped acroſs by boughs of trees laid very cloſely together, ſo as to form two fences running parallel to each other at the diſtance of ſome feet, and ſo cloſe as to confine all the materials of whatever ſize that were thrown in between them. Into this intermediate ſpace Mr Tytler ſuppoſes were thrown boughs and trunks of trees, earth and ſtones of all ſizes, large or ſmall as they could quarry or collect them. Very little care would be neceſſary in the diſpoſition of theſe materials, as the outward fence would keep the mound in form. In this way it is eaſy to conceive that a very ſtrong bulwark might be reared with great diſpatch; which, joined to the natural advantage of a very inacceſſible ſituation, and that improved by artful contrivances for increaſing the difficulty of acceſs, would form a ſtructure capable of anſwering every purpoſe of ſecurity or defence. The moſt formidable attack againſt ſuch a building would be fire, which would no doubt be always attempted, and often with ſucceſs, by an enemy who undertook the ſiege. If the beſiegers prevailed in gaining an approach to the ramparts, and, ſurrounding the external wall, ſet fire to it in ſeveral places, the conflagration muſt ſpeedily have become univerſal, and the effect may be eaſily imagined. If there happened to be any wind at the time to increaſe the heat, the ſtony parts could not fail to come into fuſion; and as the wood burnt away, ſinking by their own weight into a ſolid maſs, there would remain a wreck of vitrified matter tracking the ſpot where the ancient rampart had ſtood; irregular and of unequal height, from the fortuitous and unequal diſtribution of the ſtony materials of which it had been compoſed. This conjecture appears very probable from their appearance at this day. They do not ſeem to have ever been much higher than they are at preſent, as the fragments that have fallen from them, even where the wall is loweſt, are very inconſiderable. The durable nature of the materials would prevent them from ſuffering any changes by time; though, from the gradual increaſe of the ſoil, they muſt in ſome places have loſt conſiderably of their apparent height, and in others been quite covered. Mr Williams, in making a cut through the ramparts at Knockfarril, found in many places the vitrified matter covered with peat-moſs half a foot thick.

In confirmation of this opinion, our author likewiſe urges, that in the fortification on Craig-Phadrick, a large portion of the outward rampart bears no marks of vitrification. The reaſon of this ſeems to be, that the ſteepneſs of the hill on that ſide renders a low fence of ſtones and turf ſufficient; and no wood had probably been employed in its conſtruction. "It appears therefore highly probable (concludes our author), that the effect of fire upon theſe hill-fortifications has been entirely accidental; or, to ſpeak more properly, that fire has been employed not in the conſtruction, but towards the demolition of ſuch buildings: and for the latter purpoſe it would certainly prove much more efficacious than for the former. It is much to be doubted, whether it would be at all poſſible, even in the preſent

Vitrified Forts.

ſent day, by the utmoſt combination of labour and of ſkill, to ſurround a large ſpace of ground with a double rampart of ſtones compacted by fire, of ſuch height and ſolidity as to anſwer any purpoſe of ſecurity or defence againſt an enemy. Any ſtructure of this kind muſt have been irregular, low, fragile, eaſily ſcaled, and quite inſecure; a much weaker rampart, in ſhort, than a ſimple wall of turf or wooden palliſade. The veſtiges yet remaining, as I have already obſerved, give no room to ſuppoſe that the vitrified mound has ever been much more entire than it is at preſent. The effect of fire upon ſtructures reared in the manner I have ſuppoſed them to have been, will account moſt perfectly for their preſent appearance. It was from neceſſity that the builders of theſe fortifications betook themſelves to a mode of ſtructure ſo liable to be deſtroyed by fire. In thoſe parts where ſtones could be eaſily quarried, of ſuch ſize and form as to rear a rampart by themſelves of ſufficient ſtrength and ſolidity, there was no occaſion to employ wood or turf in its conſtruction; and it was therefore proof againſt all aſſaults by fire. Such are the ramparts which appear on the hill of Dun-Jardel, Dun-Evan, and many others, on which there is not the ſmalleſt appearance of vitrification. But on Craig Phadrick, and the other hills above deſcribed, where, from the nature of the rock, the ſtones could be procured only in irregular and generally ſmall fragments, it was neceſſary to employ ſome ſuch mode of conſtruction as I have ſuppoſed; and theſe ramparts, though ſolid and well calculated for defence againſt every attack by force or ſtratagem, were not proof againſt an aſſault by fire."

Mr Cordiner is of opinion, that the vitrifications in queſtion cannot have been the works of art, and ridicules the contrary hypotheſis; though without adducing any argument againſt it. The hill of Noth is by him ſuppoſed to have been a volcano. He deſcribes it as "a moſt majeſtic mountain, in general brown, with moſs and heath, interſperſed with bare rock, in many places crumbling down. The higheſt part of it is a circular hill, whoſe verdure, as well as height, diſtinguiſhes it from the reſt of the mountain. This is called the *Top of Noth;* and bears the ſtrongeſt reſemblance to every deſcription of a volcanic mount. At the diſtance of many miles, one can diſtinguiſh thoſe ridges which are the boundaries of the crater, indicating the hollow in the top." The gentleman from whom Mr Cordiner received the account of the vitrifications on the ſummit, informs us, that on firſt ſeeing ſpecimens of them, he imagined that they had been pieces of ſtone calcined by the burning down of a caſtle; as he had found ſomething very like them on the caſtle-hill at Cullen, in parts where the ſward of graſs was broken: but on reaching the top, and viewing the appearances on it already deſcribed, he altered his opinion. "That men hardly-beſet (ſays he) might climb up with ſome proviſions to this as a place of refuge, is probable: but that, on a barren mountain-top, far from cultivated ground, half a day's journey from the plain; that there, in any period of ſociety, man ſhould have been tempted to build that amazing rampart, is not to be imagined: they have found it a natural and extenſive fortreſs, and in critical circumſtances have made uſe of it accordingly. That it has been occupied as a place of ſtrength and of refuge, is very evident; for, ſome hundred yards lower down on the hill, there are the remains of another rampart or wall, conſiſting of looſe ſtones piled together without any cement, carried quite round the hill. This laſt has been built for an additional defence to thoſe who made their abode on the top. The top of Noth, for two-thirds downwards, is covered with a green ſward; below that, it is brown with heath: this is the very reverſe of the adjacent mountains; and the greater verdure of the upper part I imputed to a new ſoil created by the aſhes of the volcano. The opening, called a *well,* I ſuppoſe to have been the lateſt crater. About a mile ſouth, down towards the lower grounds of the *Cabrock,* there is a very pretty regular green hill; which I aſcribe to a later eruption than thoſe which may have formed the contiguous hills now covered with heath. There is an extraordinary luxuriant ſpring of water ruſhes out at once from the ſides of the hill of Noth; which is likewiſe ſome confirmation of the opinion that a volcano has ſome time exiſted there, which has occaſioned great hollows and reſervoirs of water in the heart of the mountain. And the wild irregularities of nature through all the Cabrock, the hideous and ſtrange projection of rocks from the ſides of the hills, would ſeem to indicate ſome vaſt convulſions which the earth muſt have ſuffered in theſe parts.

"The traces of ancient volcanoes (ſays Mr Cordiner) are far from being unfrequent in Scotland. The hill of Finhaven is one inſtance; and not only abundant in this ſpecies of lava, but with *tarras,* or the *pulvis puteolanus,* an *amalgama,* as Condamine calls it of calcined ſtones mixed with ſcorias and iron-ruſt reduced to powder. The hill of Beregonium, near Dunſtaffage caſtle, is another, yielding vaſt quantities of pumices or ſcoria of different kinds; many of which are of the ſame ſpecies with thoſe of the volcanic Iceland. The noble aſſemblage of baſaltic columns at Staffa, thoſe in the Iſle of Sky, and the rock Humble, are but ſo many evidences of the ancient volcanoes of this country. And finally, the immenſe ſtratum of pumex vitreus or Iceland agate, on the hill of Dun-fuin in Arran, is the laſt proof I ſhall bring in ſupport of the queſtion."

On this diſpute we can only obſerve, that whatever ſide we embrace, the difficulties ſeem to be very great, nay almoſt inſurmountable. When we conſider the great thickneſs of the walls on the top of Noth, from 8 to 12 feet, and the vaſt mound of vitrified matter, no leſs than 40 feet in breadth, mentioned by Mr Tytler, we can ſcarce conceive it poſſible that leſs than a volcanic fire could be able to form them. We may eaſily allow, that, in the way this gentleman mentions, there might be conſiderable vitrifications formed; but that ſuch immenſe maſſes ſhould be brought into perfect fuſion by the ſmall quantity of fuel which could be put round them in paliſades, or intermixed with the materials themſelves, will be incredible to every one acquainted with the extreme difficulty with which ſtones of any magnitude are brought into complete fuſion. We ſee even in the inſides of furnaces, though ſometimes built of no more unfuſible materials than common brick, no ſuch effects follow. There is a ſlight vitrification indeed, but it ſcarce ever penetrates to the depth of an inch or two, though very violent fires are kept up for a much longer time than we could ſuppoſe the wood ſurrounding thoſe walls to require for its being conſumed. In conflagrations, where houſes are conſumed, which are the only ſimilar examples we have, no ſuch effect is perceived. Even in the great fire at London in 1666, where ſo many buildings were deſtroyed, we do not hear of their walls being vitrified, though the materials of many of them were undoubtedly as fuſible as the rocks and ſtones of Craig-Phadrick, or the Top of Noth. If, on the other hand, we reject this, and adhere to the volcanic hypotheſis, our difficulties are equally great. For where ſhall we find in any other part of the world an example of volcanoes ejecting lava in the form of walls incloſing a regular area? This would be attributing ſuch a ſingularity to the volcanoes of Scotland as the moſt extravagant imagination cannot admit. We muſt therefore conclude, that though theſe ruins are certainly the works of art we have not yet ſufficient data to decide the queſtion with reſpect to their conſtruction, but that the ſubject requires a further inveſtigation.

In the paper already quoted, Mr Tytler obſerves, that "theſe ancient fortifications preſent a more curious and intereſting object of ſpeculation, than thoſe uncertain and indeed fruitleſs conjectures as to the mode in which they have been reared." This, he juſtly obſerves, muſt have been before the uſe of mortar was known; for as the country aboundeth in limeſtone, and the builders certainly would exert all their powers in giving them a proper degree of ſtrength, it would undoubtedly have been uſed. Hence we are led to aſcribe to theſe a very conſiderable degree of antiquity; for as the Britons were taught the uſe of mortar by the Romans, it is probable that we muſt date the origin of the ſtructures in queſtion before the time of the invaſion of that people, or at leaſt ſoon after it: ſo that we muſt look upon them to be more than 1650 years old; but how far beyond that period we are to ſearch for their origin, does not appear. "All that we can conclude with certainty (ſays our author), is, that they belong to a period of extreme barbariſm. They muſt have been conſtructed by a people ſcarcely removed from the ſtate of ſavages, who lived under no impreſſion of fixed or regulated property in land; whoſe only appropriated goods were their cattle; and whoſe ſole ſecurity, in a life of conſtant depredation, was the retreat to the ſummits of thoſe hills of difficult acceſs, which they had fortified in the beſt manner they could. As the ſpace incloſed was incapable of containing a great number of men, eſpecially if occupied in part by cattle, it is preſumable, that theſe retreats were formed chiefly for the ſecurity of the women and children of the canton and of their herds. They could be defended by a few men, while the reſt of the tribe were engaged with their enemies in the field."

Our author concludes his diſſertation with a conjecture, which indeed ſeems well ſupported, that the forts in queſtion were conſtructed, not only before the Roman invaſion, but before the introduction of the rites of the Druids into Britain; as "there appears no probability that the inhabitants either lived under ſuch a government as we know to have prevailed under the influence of the Druids, or had any acquaintance with thoſe arts which it is certain they cultivated."

FORTALICE, in Scots law, ſignified anciently a ſmall place of ſtrength, originally built for the defence of the country; and which, on that account, was formerly reckoned *inter regalia*, and did not go along with the lands upon which it was ſituated without a ſpecial grant from the crown. Now, fortalices are carried by a general grant of the lands; and the word is become ſynonymous with manor-place, meſſuage, &c.

FORTESCUE (Sir John), lord chief juſtice of the king's bench, and lord high chancellor of England, in the reign of king Henry VI. was deſcended from the ancient family of Forteſcue, in the county of Devon. He ſtudied the municipal laws of England in Lincoln's Inn, of which he was made one of the governor's in the fourth and ſeventh years of the reign of king Henry VI. In 1430 he was called to the degree of a ſerjeant at law, and in 1441 was conſtituted the king's ſerjeant. The following year he was made lord chief juſtice of the king's bench; in which honourable ſtation he continued till near the end of that king's reign, who ſhowed him many particular marks of his favour, and advanced him to the poſt of lord high chancellor of England. During the reign of king Edward IV. he followed the fortunes of the houſe of Lancaſter, and was many years in exile with queen Margaret and prince Edward her ſon. At length, they having a proſpect of retrieving their deſperate fortunes, the queen and prince returned to England, and Sir John Forteſcue, with many others, accompanied them: but ſoon after the deciſive battle of Tewkſbury, he was thrown into priſon and attainted, with other Lancaſtrians; but found means to procure his pardon from Edward IV. He wrote, 1. A learned commentary on the politic laws of England, for the uſe of prince Edward; to one edition of which Mr Selden wrote notes. 2. The difference between an abſolute and limited monarchy, as it more particularly regards the Engliſh conſtitution (which was publiſhed, with ſome remarks, by John Forteſcue, afterwards lord Forteſcue, in 8vo. in 1714; and a ſecond edition was publiſhed, with amendments, in 1719): And ſeveral works, which ſtill remain in manuſcript. He died near 90 years of age; and was buried in the pariſh church of Ebburton, where a monument was erected to his memory, in 1677, by one of his deſcendants.

FORTH, one of the moſt noble and commodious rivers in Scotland. It takes its riſe near the bottom of Lomond hills; and running from weſt to eaſt, receives in its paſſage many conſiderable ſtreams, deriving their waters from the eminences in the midland counties of North Britain. Between Stirling and Alloa, the Forth winds in a moſt beautiful and ſurpriſing manner; ſo that, though it is but four miles by land, it is 24 by water between thoſe two places. Below Alloa the river expands itſelf to a great breadth between the counties of Lothian and Fife, till at Queen's-ferry it is contracted by promontories ſhooting into it from both coaſts; ſo that, from being four or five, there it is not above two miles broad. In the middle of the channel lies a ſmall iſland called *Inchgarvy*, which has a ſpring of freſh water: upon the iſland there is an ancient fort, which has been lately repaired; and if there were either forts or blockhouſes on the oppoſite promontories, that part of the river which lies between Alloa and Queen's-ferry would be as ſecure and convenient a harbour as could be deſired. A little below this, near the north ſhore, lies Inchcomb, on which are the remains of an ancient monaſtery of conſiderable extent; and oppoſite to Leith ſtands the iſland of Inchkeith, formerly fortified, but now in ruins. Below Queen's-ferry the north and ſouth ſhores receding, the body of the water gradually enlarges till it becomes two or three leagues broad, affording ſeveral ſafe harbours on both ſides, and excellent roads throughout, unembarraſſed with latent rocks, ſhoals, or ſands; and allowing ſecure anchorage to the largeſt ſhips within a league of the coaſt in almoſt any part of the Frith, and to veſſels of a ſmaller ſize within a mile or leſs. The Firth, or (as it is commonly written) the *Frith*, of Forth, is, at the mouth of it, from North Berwick to Fifeneſs, full five leagues broad; having the little iſland of May (on which there is a light-houſe, and there might alſo be a fort) in the middle of it, and to the weſt of this, the rocky iſland of Baſs; notwithſtanding which, the largeſt fleet may enter and ſail up it many miles with the utmoſt facility and in the greateſt ſafety. In 1781, Admiral Parker's fleet lay ſome weeks oppoſite to Edinburgh, accompanied by 500 ſail of merchantmen, the whole in full view of the city and caſtle.

The Forth was known to the ancients by the name of *Bodotria*, or (as Ptolemy calls it) *Boderia*, and has been ever famous for the number of its havens; ſome of which are, indeed, in their preſent condition, ſcarce worthy of that name. It is navigable for merchantmen, as high as Alloa, 50 miles from the ſea; and for coaſters as far as Stirling, 24 miles further by water, though only four by land in a direct line, as already obſerved. The tide flows only a full mile above Stirling to a place called *Craigforth*, where the proprietor intercepts the paſſage of the ſalmon by a cruive or weir, very injurious to the large tract of country, which ſtretches as far as Lomond weſtward. The river from Stirling to the bridge of Aberfoil, at the entrance into the Weſt-Highlands, is only paſſable for man or horſe at few places, and theſe in dry ſeaſons. It glides gently thro' a dead flat, from Gartmore eaſtward; "and on theſe accounts (ſays Mr Knox*) it might be made navigable for barges, at a trifling expence to the proprietors of the lands, an improvement much wanted in a rich, extenſive, and populous valley, without market towns, coal and lime. Suppoſing this work to be executed, of which there is ſome probability, the whole extent of navigation on the Forth, will, including all its windings, exceed 200 miles, through a coaſt of nearly 100 miles; fertile, populous, induſtrious; and from Stirling eaſtward, almoſt lined with towns, anciently the ſeats of commerce and navigation, till they were ruined by the Engliſh depredations; in which miſerable ſtate, ſome of them ſtill remain, while others begin to reſume the appearance of buſineſs. The principal object of theſe towns was the fiſheries, which they proſecuted with great vigour as far as Iceland, till the time of the Union, from wich period the eaſtern fiſheries gradually dwindled away; and the poor fiſhermen, unable to ſubſiſt themſelves upon air and water, took up the trade of ſmuggling; but ſo ſoon as the fiſhery laws ſhall be amended, the ſalt duties aboliſhed, and an adequate bounty extended to boats as well as buſſes, theſe people will readily fall into the track of their anceſtors, live by honeſt induſtry, and add new vigour to our naval ſtrength. Many of the ports are nearly choaked up, others want repairs, which neither the individuals nor the corporations of thoſe decayed places can accompliſh. Though the harbours on the Forth are in general ſmall, the depth of water might be made ſufficient for veſſels of 200 tons burden, which fully anſwers the purpoſes of their coaſting and Baltic trade; but to obtain this, or even a leſs depth of water, an aid of 50,000 l. would be requiſite."

By this river and the Clyde, Scotland is almoſt divided into two parts. The Forth falls into the eaſt ſea below Edinburgh, and has an eaſy communication with the whole eaſtern coaſt of Great-Britain; with France, Oſtend, Holland, Hamburgh, Pruſſia, Dantzic, Ruſſia, Sweden, Denmark, Norway, and Greenland. The Clyde falls into the Atlantic ocean below Glaſgow, and communicates with the weſtern coaſt of Great Britain; with Ireland, the ſouth of France, Portugal, Spain, the Mediterranean, America, and the Weſt-Indies. Theſe two rivers, thus falling in oppoſite directions into the two ſeas which environ the iſland, and the neck of land between them, amounting ſcarcely to 24 miles, gave riſe to the idea of a junction, ſo as to open a communication acroſs the kingdom, and thereby cut off the long dangerous navigation by the Land's End and the Pentland Frith: an object of vaſt utility, and which has lately been happily accompliſhed. See the article CANAL.

* *View of the Britiſh Empire*, vol. ii. p. 518.

FORTIFICATION;

THE art of fortifying a town or other place; or of putting them in ſuch a poſture of defence, that every one of its parts defends, and is defended by, ſome other parts, by means of ramparts, parapets, moats, and other bulwarks; to the end that a ſmall number of men within may be able to defend themſelves for a conſiderable time againſt the aſſaults of a numerous army without, ſo that the enemy in attacking them muſt of neceſſity ſuffer great loſs.

The origin and riſe of fortification is undoubtedly owing to the degeneracy of mankind. In the firſt ages of the world, men were diſperſed up and down the countries in ſeparate families, as we are told in the hiſtories of the Jews and Scythians, who wandered from one place to another, for the ſake of finding paſture for their cattle. Theſe families became in time ſo numerous as to form large communities, which ſettled all together in a place; from whence villages and towns had their origin and riſe: but they found it was neceſſary, for the common ſecurity, to ſurround thoſe towns with walls and ditches, to prevent all violences *from their neighbours, and ſudden ſurpriſes.* This was ſufficient for ſome time, till offenſive weapons were invented, and conquering became a faſhion. Then walls with loop-holes were made at proper diſtances, in order to ſcreen the defenders againſt the arrows of the aſſailants: but finding that, as ſoon as the enemy got once cloſe to the walls, they could from no part be diſcovered or repulſed; for this reaſon they added ſquare towers at proper diſtances from each other, ſo that every part of the wall might be defended by the adjacent ſides of the towers. However, this manner of incloſing of towns was found to be imperfect, becauſe there remained ſtill one of the faces of the towers which fronted the field that could not be ſeen from any other part, and therefore could not be defended. To remedy this, they made the towers round inſtead of ſquare, imagining this figure to be the ſtrongeſt to reſiſt the battering engines, as likewiſe to be better defended from the other parts of the wall.

Notwithſtanding the ſuperiority of this method above the former, there remained yet a part of theſe towers unſeen and incapable of being defended; which made them change the figure of the towers again; that is, they made them ſquare as before; but, inſtead of preſenting a face to the field as formerly, they preſented an angle; by this means they effectually found out ſuch a diſpoſition of their works, that no part could be attacked without being ſeen or defended by ſome other part.

This laſt method was uſed a long while; and would in all probability have continued to this day, if gunpowder had not been found out: but the violence of the guns and mortars ſoon convinced the world, that ſuch towers and walls were but a weak defence againſt theſe thundering engines; and beſides, as the nature of the attack was entirely changed, it was alſo neceſſary to change that of fortifying likewiſe.

From that time ramparts were added to the walls, the towers enlarged into baſtions, and all ſorts of outworks have been added, ſuch as ravelins, counterguards, horn and crown works, and others of the like nature, in order to render the defence in ſome meaſure equivalent to the attack.

Notwithſtanding all the improvements which have been made in the art of fortifying ſince the invention of gun-powder, that of attacking is ſtill ſuperior to it: engineers have tried in vain to render the advantages of a fortification equal to thoſe of the attack; the ſuperiority of the beſiegers fire, together with the greater number of men, obliges generally, ſooner or latter, the beſieged to ſubmit.

The greateſt improvement made in the art of attacking happened in the year 1697, when M. Vauban made firſt uſe of ricochet-firing at the ſiege of Ath, whereby the beſieged placed behind the parapets were as much expoſed to the fire of the beſiegers as if there had been none; whereas, before, they had been ſecure as long as the parapet was not demoliſhed; and the worſt is, that there can be no remedy found to prevent this enfilading, without falling into inconveniences almoſt as bad as thoſe which we endeavour to avoid.

FORTIFICATION is either regular or irregular. *Regular* fortification, is that built in a regular polygon, the ſides and angles of which are all equal, being commonly about a muſket-ſhot from each other. *Irregular* fortification, on the contrary, is that where the ſides and angles are not uniform, equidiſtant, or equal; which is owing to the irregularity of the ground, valleys, rivers, hills, and the like.

Vauban's Method.

SECT. I. *Of Regular Fortification.*

ALTHOUGH authors agree as to the general form in the preſent manner of fortifying, yet they moſtly differ in particular conſtructions of the parts. As it would be both needleſs and ſuperfluous to treat of all the different methods hitherto propoſed, we ſhall content ourſelves with explaining thoſe only which are moſt eſteemed by the beſt judges, and have been moſtly put in practice.

Conſtruction of M. VAUBAN's Method.

This method is divided into little, mean, and great; the *little* is chiefly uſed in the conſtruction of citadels, the *mean* is that of all ſorts of towns, and the *great* in particular caſes only.

Plate CXCVII.

We ſhall give the conſtruction of the mean, as being moſt uſeful; and refer the reader to the table hereafter, for thoſe dimenſions which are different in theſe ſeveral fortifications.

Inſcribe in a circle a polygon of as many ſides as the fortification is deſigned to have fronts; let AB be one of the ſides of half an hexagon, which biſect by the perpendicular CD; divide half AC of it into nine equal parts, and one of theſe into ten others; then theſe diviſions will ſerve as a ſcale to conſtruct all the parts of the fortification, and each of them is ſuppoſed to be a toiſe or fathom, that is, ſix French feet; and therefore the whole ſide AB is ſuppoſed to be 180 toiſes.

As the dividing a line into ſo many equal parts is troubleſome and tedious; it is more convenient to have a ſcale of equal parts by which the works may be conſtructed.

If therefore, in this caſe, the radius is taken equal to 180 toiſes, and the circle deſcribed with that radius being divided into ſix equal parts, or the radius being carried ſix times round, you will have an hexagon inſcribed; AB being biſected by the perpendicular CD as before, ſet off 30 toiſes from C to D, and draw the indefinite lines ADG, BDF; in which take the parts AE, BH, each equal to 50 toiſes; from the centre E deſcribe an arc through the point H, meeting AD in G, and from the centre H deſcribe an arc through the point E, meeting BD in F; or which is the ſame, make each of the lines EG, HF, equal to the diſtance EH; then the lines joining the points A, E, F, G, H, B, will be the principal or outline of the front.

If the ſame conſtruction be performed on the other ſide of the polygon, you will have the principal or outline of the whole fortification.

If, with a radius of 20 toiſes, there be deſcribed circular arcs, from the angular points B, A, M, T, and lines are drawn from the oppoſite angles E, H, &c. ſo as to touch theſe arcs, their parts *ab*, *bc*, &c. together with theſe arcs, will repreſent the outline of the ditch.

DEFINITIONS.

1. The part FEALN, is called the baſtion.
2. AE, AL, the faces of the baſtion.
3. EF, LN, the flanks.
4. FG, the curtain.

Of Orillons.

Plate CXCVII.

5. FN, the gorge of the baſtion.

6. AG, BF, the lines of defence.

7. AB, the exterior ſide of the polygon.

8. CD, the perpendicular.

9. Any line which divides a work into two equal parts, is called the capital of that work.

10. *a b c*, the counterſcarp of the ditch.

11. A, M, the flanked angles.

12. H, E, L, the angles of the ſhoulder, or ſhoulder only.

13. G, F, N, the angles of the flank.

14. Any angle whoſe point turns from the place is called a *ſaliant angle*, ſuch as A, M; and any angle whoſe point turns towards the place, *re-entering angle*, ſuch as *b*, F, N.

15. If there be drawn two lines parallel to the principal or outline, the one at 3 toiſes diſtance, and the other at 8 from it; then the ſpace *y x* included between the principal one and that fartheſt diſtant, is called the *rampart*.

And the ſpace *x x*, contained by the principal line, and that near to it, and which is generally ſtained black, is called the *parapet*.

Of Ravelins.

Plate CXCVII.

16. There is a fine line drawn within four feet of the parapet, which expreſſes a ſtep called *banquette*.

N. B. All works have a parapet of three toiſes thick, and a rampart from 8 to 10, beſides their ſlopes. The rampart is elevated more or leſs above the level of the place, from 10 to 20 feet, according to the nature of the ground and the particular conſtructions of engineers.

The parapet is a part of the rampart elevated from 6 to 7$\frac{1}{2}$ feet above the reſt, in order to cover the troops which are drawn up there from the fire of the enemy in a ſiege; and the banquette is two or three feet higher than the rampart, or about four feet lower than the parapet; ſo that when the troops ſtand upon it, they may juſt be able to fire over the parapet.

17. The body of the place, is all that which is contained within this firſt rampart: for which reaſon, it is often ſaid to conſtruct the body of the place; which means properly, the conſtruction of the baſtions and curtains.

18. All the works which are conſtructed beyond the ditch before the body of the place are called *outworks*.

T A B L E.

	Forts.						Little Fortif.				Mean.		Great.	
Side of Polyg.	80	90	100	110	120	130	140	150	160	170	180	190	200	260
Perpendicul.	10	11	$12\frac{1}{2}$	14	15	16	20	21	23	25	30	31	25	22
Faces baſt.	22	25	28	30	33	35	40	42	45	47	50	53	55	60
Cap. of rav.	25	28	30	35	38	40	45	50	50	52	55	55	60	50

In the firſt vertical column are the numbers expreſſing the lengths of the exterior ſides from 80 to 260. In the ſecond, the perpendiculars anſwering to theſe ſides. In the third, the lengths of the faces of baſtions; and in the fourth, the lengths of the capitals of the ravelins.

The forts are moſtly, if not always, ſquare: for which reaſon the perpendiculars are made one-eighth of the exterior ſides; becauſe if they were more, the gorges of the baſtions would become too narrow.

The little fortification is chiefly deſigned for citadels, and are commonly pentagons; the perpendiculars are made one-ſeventh of the exterior ſide: the mean is uſed in all kinds of fortifications from an hexagon upwards to any number of ſides: and the great is ſeldom uſed but in an irregular fortification, where there are ſome ſides that cannot be made leſs without much expence; or in a town which lies near a great river, where the ſide next the river is made from 200 to 260 toiſes; and as that ſide is leſs expoſed to be attacked than any other, the perpendicular is made ſhorter, which ſaves much expence.

The faces of the baſtions are all $\frac{2}{7}$ths of the exterior ſides, or nearly ſo, becauſe the fractions are neglected.

It may be obſerved in general, that in all ſquares the perpendicular is $\frac{1}{8}$th of the exterior ſide, and all pentagons $\frac{1}{7}$th, and in all the reſt upward $\frac{1}{6}$th.

1. *Conſtruction of Orillons and retired Flanks.*

Describe the front MPQRST as before, and divide the flank into three equal parts, of which ſuppoſe S *r* to be one; from the oppoſite flanked angle M draw a line M *r*, in which take the part *m r* of 5 toiſes; take likewiſe R *n* in the line of defence MR, produced, equal to 5 toiſes, and join *m n*, upon which as a baſe deſcribe the equilateral triangle *n p m*, and from the angle *p*, oppoſite to the baſe as centre, is deſcribed the circular flank *n m*.

And if S*r* be biſected by the perpendicular 1, 2, and another be erected upon the face ST, at S; the interſection 2 of theſe two perpendiculars will be the centre of the arc which forms the orillon.

The orillons are very uſeful in covering the retired flanks, which cannot be ſeen but directly in the front; and as theſe orillons are round, they cannot be ſo eaſily deſtroyed as they would be if they were of any other figure.

2. *Conſtruction of Ravelins or Half Moons.*

Fig. 2. Set off 55 toiſes, from the re-entering angle O of the counterſcarp, on the capital O L or on the perpendicular produced, and from the point L draw lines to the ſhoulder A B; whoſe parts L M, L N, terminated by the counterſcarp, will be the faces, and M O, O N, the ſemigorges of the ravelin required.

This is Mr Vauban's method of conſtructing ravelins, according to ſome authors: and others will have the faces of the ravelin terminate on thoſe of the baſtions within 3 toiſes of the ſhoulders; which ſeems to be the beſt way, for theſe ravelins cover the flanks much better than the others.

The ditch before the ravelin is 12 toiſes its counterſcarp

Fig. 10.

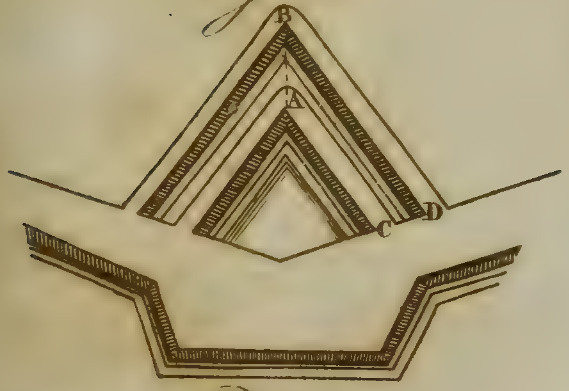


Fig. 3.

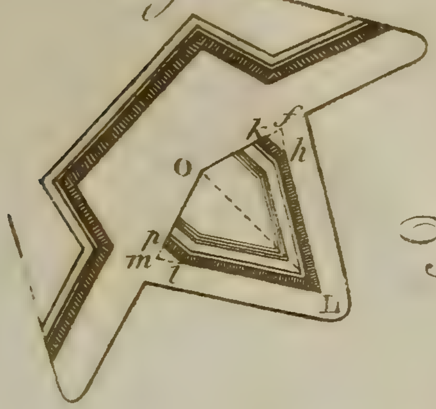


Fig. 2.

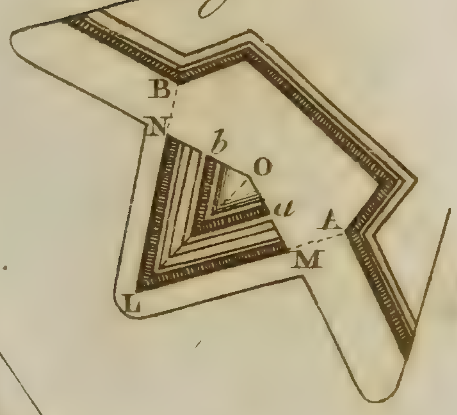


Fig. 1.

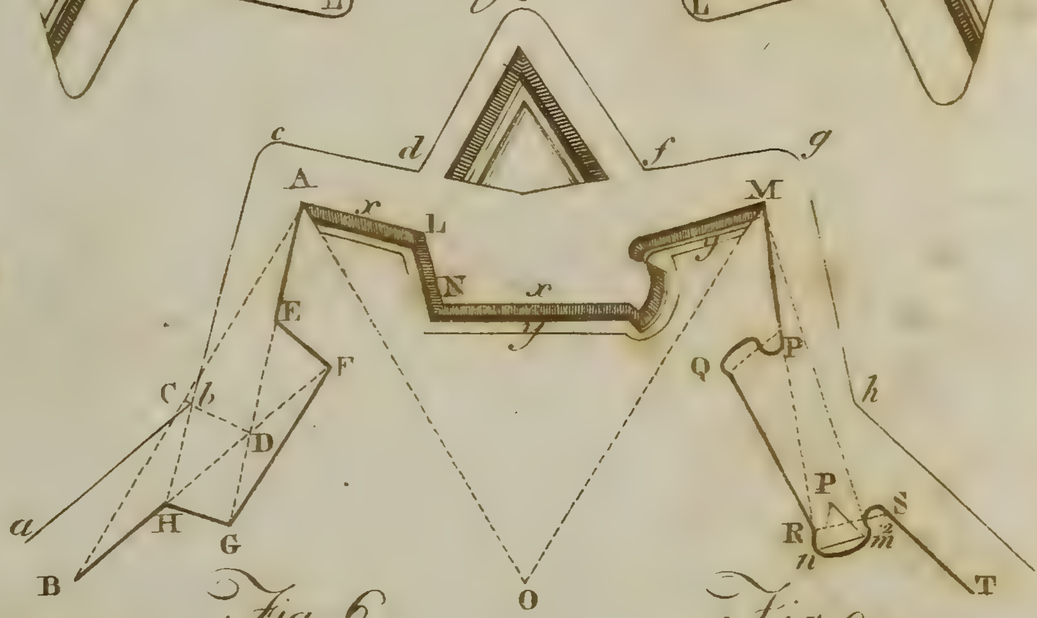


Fig. 11.

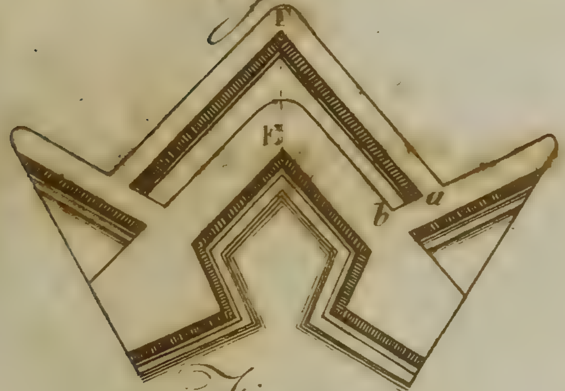


Fig 6

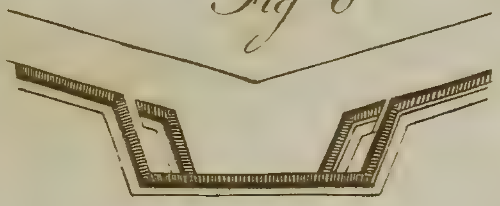


Fig. 12.

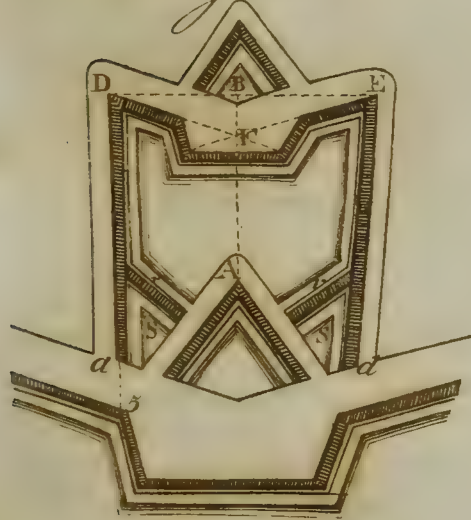


Fig. 9.

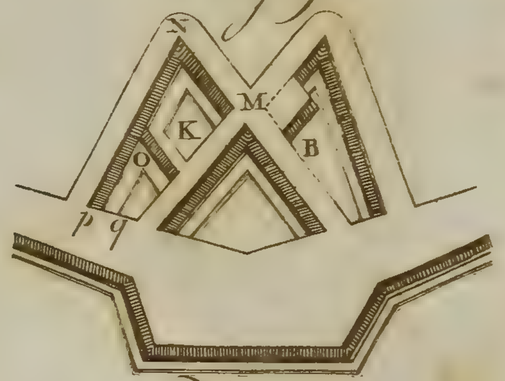


Fig. 7.

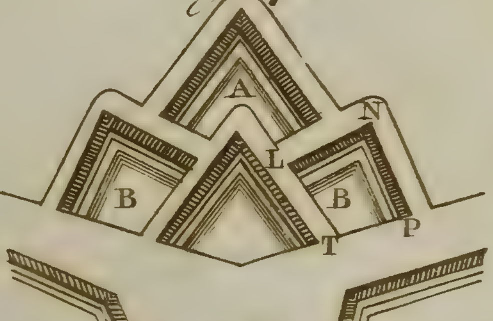


Fig. 8.

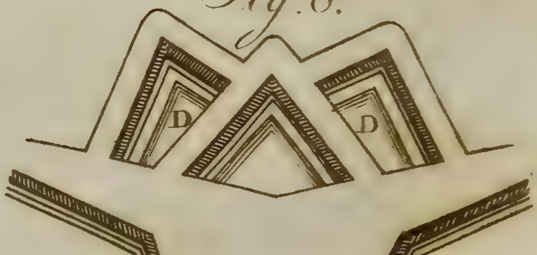


Fig 13

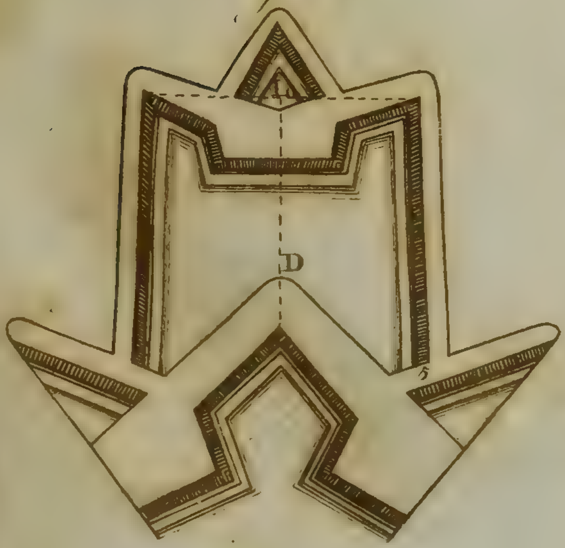


Fig. 4.

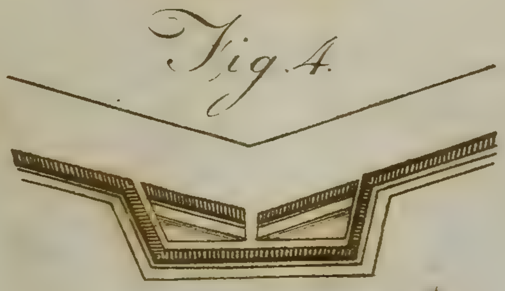
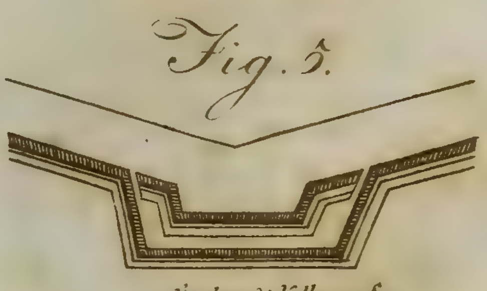


Fig. 5.



Thackara & Vallance Sc.

Of Tenailles. Plate CXCVII.

ſcarp parallel to the faces of the ravelins ; and is made in a circular arc, before the ſallient angle : as likewiſe all ditches are in general.

When the ravelins are made with flanks, as in fig. 3. the faces ſhould terminate on thoſe of the baſtions, at leaſt 5 toiſes from the ſhoulders.

The flanks are made by ſetting off 10 toiſes from the extremities of the faces, from *f* to *h*, and from *m* to *l* ; and from the points *h*, *l*, the flanks *h k*, *l p*, are drawn parallel to the capital LO of the ravelin.

There are ſometimes redoubts made in the ravelin, ſuch as in fig. 2. which is done by ſetting off 16 toiſes from the extremities of the faces on the ſemi-gorges from N to *b*, and from M to *a* ; and from the points *b*, *a*, the faces are drawn parallel to thoſe of the ravelin : the ditch before the redoubt is 6 toiſes, and its counterſcarp parallel to the faces.

3. *Conſtruction of Tenailles.*

A tenaille is a work made in the ditch before the curtains, the parapet of which is only 2 or 3 feet higher than the level ground of the ravelin. There are three different ſorts : the firſt are thoſe as fig. 4. which are made in the direction of the lines of defence leaving a paſſage of 3 toiſes between their extremities and the flanks of the baſtions, as likewiſe another of 2 in the middle for a bridge of communication to the ravelin.

The ſecond ſort are thoſe as in fig. 5. Their faces are in the lines of defence, and 16 toiſes long, beſides the paſſage of 3 toiſes between them and the flanks of the baſtions ; their flanks are found by deſcribing arcs from one ſhoulder of the tenaille as centre through the other, on which are ſet off 10 toiſes for the flanks deſired.

And the third ſort are thoſe as in fig 6. Their faces are 16 toiſes, as in the ſecond ſort, and the flanks are parallel to thoſe of the baſtions.

The uſe in general of tenailles, is to defend the bottom of the ditch by a grazing fire, as likewiſe the level ground of the ravelin, and eſpecially the ditch before the redoubt within the ravelin, which can be defended from no where elſe ſo well as from them.

The firſt ſort do not defend the ditch ſo well as the others, as being too oblique a defence : but as they are not ſubject to be enfiladed, M. Vauban has genely preferred them in the fortifying of places as may be ſeen in the citadel of Lille, at Laudau, New Briſac, and in a great many other places.

The ſecond ſort defend the ditch much better than the firſt, and add a low flank to thoſe of the baſtions ; but as theſe flanks are liable to be enfiladed they have not been much put in practice. This defect might however be be remedied, by making them ſo as to be covered by the extremities of the parapets of the oppoſite ravelins, or by ſome other work.

As to the third ſort, they have the ſame advantage as the ſecond, and are likewiſe liable to the ſame objections ; for which reaſon, they may be uſed with the ſame precautions which have been mentioned in the ſecond.

Tenailles are eſteemed ſo neceſſary, that there is hardly any place fortified without them : and it is not without reaſon. For when the ditch is dry, the part behind the tenailles ſerves as a place of arms, from which the troops may ſally, deſtroy the works of the enemy in the ditch, oppoſe their deſcent, and retire with ſafety ; and the communication from the body of the place to the ravelin becomes eaſy and ſecure : which is a great advantage ; for by that means the ravelin may be a much better defence, as it can be ſupplied with troops and neceſſaries at any time. And if the ditch is wet, they ſerve as harbours for boats, which may carry out armed men to oppoſe the paſſage over the ditch whenever they pleaſe ; and the communication from the tenailles to the ravelin, becomes likewiſe much eaſier than it would be without them.

Of Lunettes, &c. Plate CXCVII.

4. *Conſtruction of Lunettes.*

Fig. 7. Lunettes are placed on both ſides of the ravelin, ſuch as B, to increaſe the ſtrength of a place : they are conſtructed, by biſecting the faces of the ravelin with the perpendicular LN ; on which is ſet off 30 toiſes from the counterſcarp of the ditch for one of its faces ; the other face, PN, is found by making the ſemi-george TP of 25 toiſes ; the ditch before the lunettes is 12 toiſes, the parapet 3, and the rampart 8, as in the ravelin.

There is ſometimes another work made to cover the ſaliant angle of the ravelin, ſuch as A, called *bonnet*, whoſe faces are parallel to thoſe of the ravelin, and when produced biſect thoſe of the lunettes ; the ditch before it is 20 toiſes.

There are likewiſe lunettes, ſuch as D in fig. 8. whoſe faces are drawn perpendicular to thoſe of the ravelin, within a third part from the ſaliant angle ; and their ſemi-gorges are only 10 toiſes.

Theſe kind of works may make a good defense, and coſt no very great expence ; for as they are ſo near the ravelin, the communication with it is very eaſy, and one cannot well be maintained till they are all three taken.

5. *Conſtruction of Tenaillons.*

Fig. 9. Produce the faces of the ravelin beyond the counterſcarp of the ditch, at a diſtance MN of 30 toiſes, and take on the counterſcarp of the great ditch 15 toiſes from the re-entering angle *p* to *q*, and draw N *q* , then *q* NM*p* will be the tenailles required ; its ditch is 12 toiſes, that is, the ſame as that of the ravelin. Sometimes there is made a retired battery in the front of the tenaillons, as in B ; this battery is 10 toiſes from the front to which it is parallel, and 15 toiſes long.

There are commonly retrenchments made in the tenaillons, ſuch as O ; their parapets are parallel to the fronts MN, and biſect the ſide *q* N ; the ditch before this retrenchment is 3 toiſes : and there is a banquette before the parapet next to the ditch of about 8 feet, called *berm* ; which ſerve, to prevent the earth of the parapet (which ſeldom has any revetment) from falling into the ditch.

It is to be obſerved, that the ravelin, before which tenaillons are conſtructed, muſt have its ſaliant angle much greater than the former conſtruction makes them ; otherwiſe the ſaliant angles of the tenaillons become too acute ; for which reaſon we made the capital of this

Of Counter-guards, &c.

Plate CXCVII.

this ravelin 45 toiſes, and the faces terminate within 3 toiſes of the ſhoulders.

6. *Conſtruction of Counterguards.*

Fig. 10, 11. When the counterguard is placed before the ravelin, ſet off 40 toiſes on the capital of the ravelin from the ſaliant angle A to the ſaliant angle B, of the counterguard; and 10 from C to D, on the counterſcarp of the ditch.

When the counterguard is before the baſtion, ſuch as in fig. 2. its ſaliant angle F is 50 toiſes from the ſaliant angle E of the baſtion, and the breadth near the ditch of the ravelin 10 toiſes as before.

The ditch before the counterguards is 12 toiſes, and its counterſcarp parallel to the faces.

Counterguards are made before the ravelin on ſome particular occaſions only; but are frequently conſtructed before the baſtions, as covering the flanks wonderfully well. Some authors, as Mr Blondel and Mr Coehorn, will have them much narrower than they are here.

Conſtruction of Hornworks.

Fig. 12. Produce the capital of the ravelin beyond the ſaliant angle A, at a diſtance AB; of about 80 toiſes; draw DBE at right angles to AB; in which take BD, BE, each equal to 55 toiſes; and on the exterior ſide DE, trace a front of a polygon in the ſame manner as that of the body of the place, making the perpendicular BF 10 toiſes, and the faces 30.

The branches D *a*, E *b*, of the hornwork, when produced, terminate on the faces of the baſtions, within 5 toiſes of the ſhoulders. The ditch of the hornwork is 12 toiſes, and its counterſcarp parallel to the branches; and in the front terminates at the ſhoulders, in the ſame manner as the great ditch before the baſtions.

The capital of the ravelin before the front of the hornwork is 35 toiſes, and the faces terminate on the ſhoulders, or rather 2 or 3 toiſes beyond them: and the ditch before the ravelin is 8 toiſes.

There are ſometimes retrenchments made within the hornwork, ſuch as S, S; which are conſtructed by erecting perpendiculars to the faces of the ravelins, within 25 toiſes of their extremities. This retrenchment, like all others, has a parapet turfed only with a berm of 8 feet before it: as likewiſe a ditch from 3 to 5 toiſes broad.

Fig. 13. When a horn work is made before the baſtion, the diſtance DL of the front from the ſaliant angle of the baſtion is 100 toiſes, and the branches terminate on the faces of the adjacent ravelins within 5 toiſes from their extremities; all the reſt is the ſame as before.

1. *Conſtruction of Crown-works.*

Plate CXCVIII.

From the ſaliant angle, A (fig. 1.) of the ravelin, as a centre, deſcribe an arc of a circle with a radius of about 120 toiſes, cutting the capital of the ravelin, produced at C; from the point C, ſet off the cords CB, CF, each of them equal the 110 toiſes; and on each of which, as an exterior ſide, conſtruct a front of a polygon of the ſame dimenſions as in the hornwork that is, the perpendicular ſhould be 81 toiſes, the faces 30, and the branches terminate on the faces of the baſtions within 25 toiſes of the ſhoulders.

Of Covert-ways, &c.

Plate CXCVIII.

The ditch is 12 toiſes, the capital of the ravelin 35, and its ditch 8; that is the ſame as in the hornwork.

Sometimes the crownwork is made before the baſtion, as in fig. 2. The arc is deſcribed from the ſaliant angle A of the baſtion, with a radius of 120 toiſes, as before; and the branches terminate on the faces of the adjacent ravelins within 25 toiſes of their extremities: the reſt of the dimenſions and conſtructions are the ſame as before.

Hornworks as well as crownworks, are never made but when a large ſpot of ground falls beyond the fortification, which might be advantageous to an enemy in a ſiege, or to cover ſome gate or entrance into a town.

9. *Conſtruction of Covert-ways and Glacis.*

Although we have not hitherto mentioned the covert-way nevertheleſs all fortifications whatſoever have one; for they are eſteemed to be one of the moſt eſſential parts of a modern fortification; and it is certain, the taking the covert-way, when it is in a good condition and well defended, is generally the moſt bloody action of the ſiege.

After having conſtructed the body of the place and all the outworks which are thought neceſſary, lines are drawn parallel to the outmoſt counterſcarp of the ditches, at 6 toiſes diſtant from it; and the ſpace *mn*, *m n*, included between that line and the counterſcarp will be the covert-way required.

Fig. 3. There is in every re-entering angle of the counterſcarp a place of arms *m*; which is found by ſetting off 20 toiſes from the re-entering angle *a*, on both ſides from *a* to *b*, and from *a* to *c*; and from the points *b*, *c*, as centres, arcs are deſcribed with a radius of 25 toiſes, ſo as to interſect each other in *d*; then the lines drawn from this interſection to the points *b*, *c*, will be the faces of the places of arms.

If lines are drawn, parallel to the lines which terminate the covert way, and the places of arms, at 20 toiſes diſtant from them, the ſpace *x*, *x*, *x*, between theſe lines and thoſe which terminate the covert-way, will be the glacis.

At the extremities of the places of arms, are traverſes made, ſuch as *v*, *v*, which ſerve to incloſe them; theſe traverſes are 3 toiſes thick, and as long as the covert-way is broad; and a paſſage is cut in the glacis round them, of about 6 or 8 feet, in order to have a free communication with the reſt of the covert-way.

There are alſo traverſes of the ſame dimenſions before every ſaliant angle of the baſtion and outworks, and are in the ſame direction as the faces of thoſe works produced; and the thickneſs lies at the ſame ſide as the parapets.

The paſſages round theſe laſt traverſes are likewiſe from 6 to 8 feet wide.

In each place of arms are two ſally ports *z z*, which are 10 or 12 feet wide, for the troops to ſally out; in time of a ſiege they are ſhut up, with barriers or gates.

10. *Conſtruction of Arrows and Detached Redoubts.*

An arrow is a work made before the ſaliant angles of the glacis, ſuch as A, fig. 3. It is compoſed of a parapet

Fig. 1.

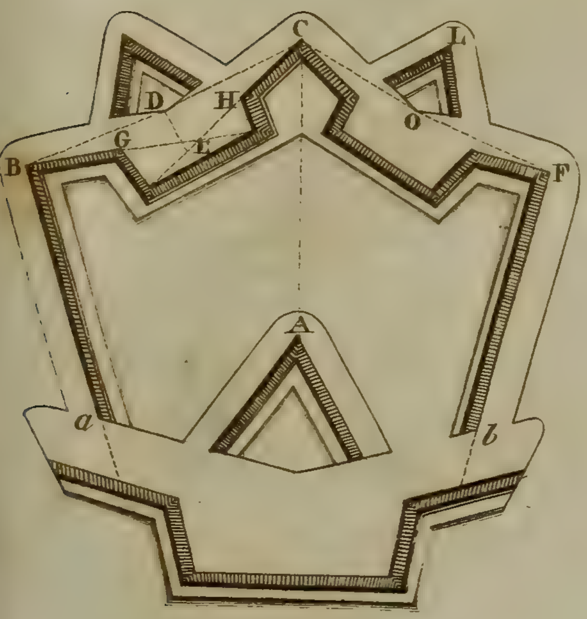


Fig. 3.

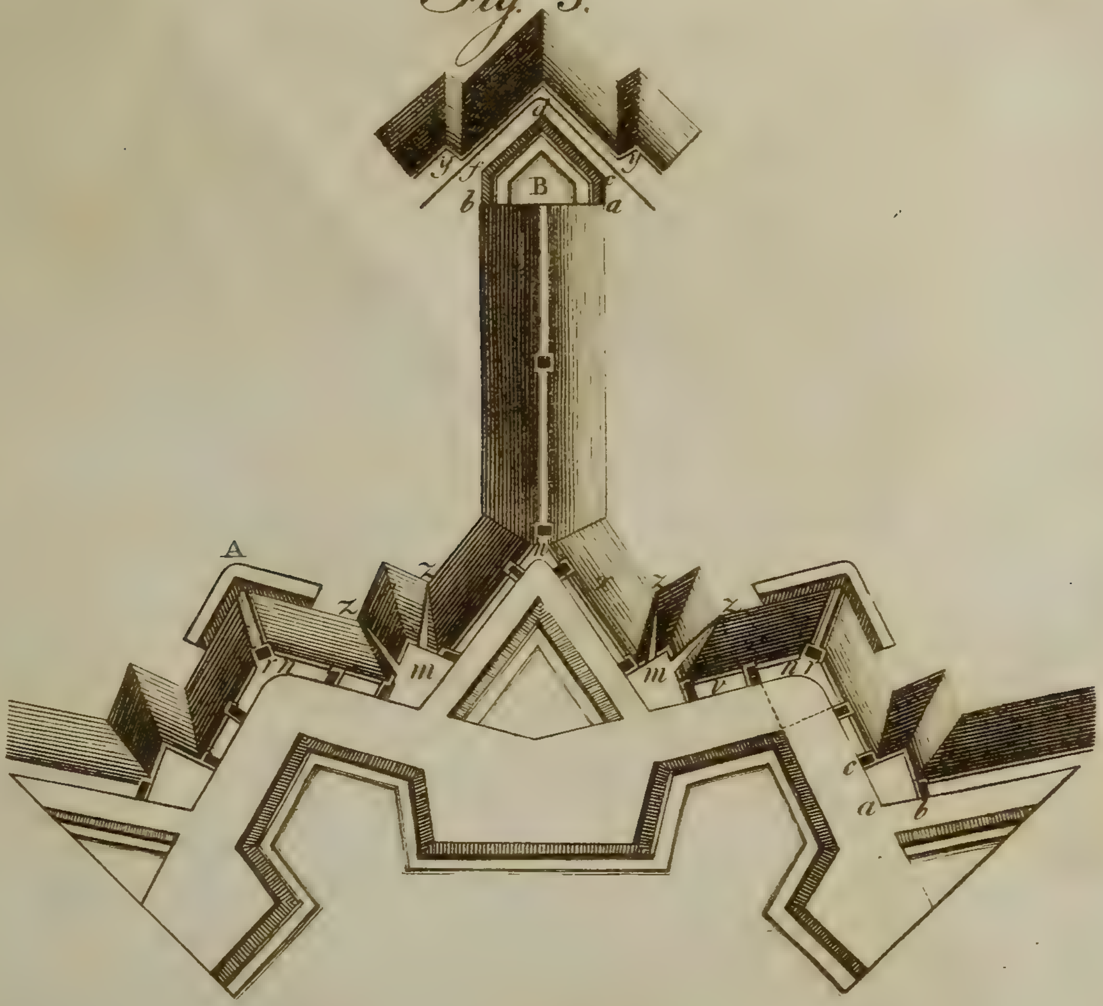


Fig. 2.

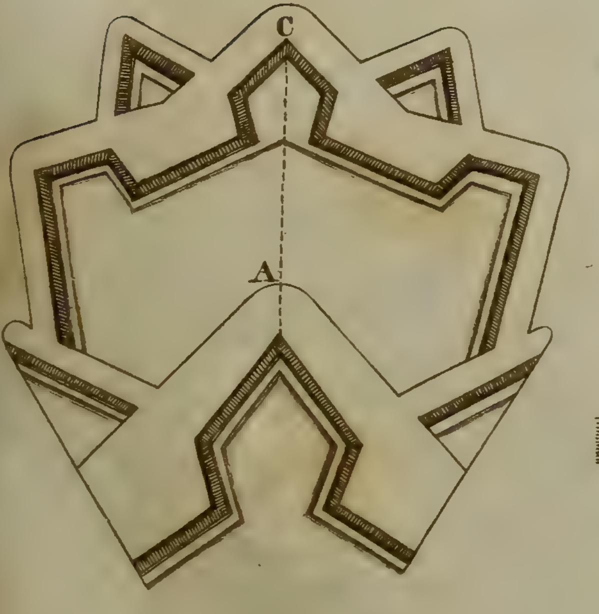
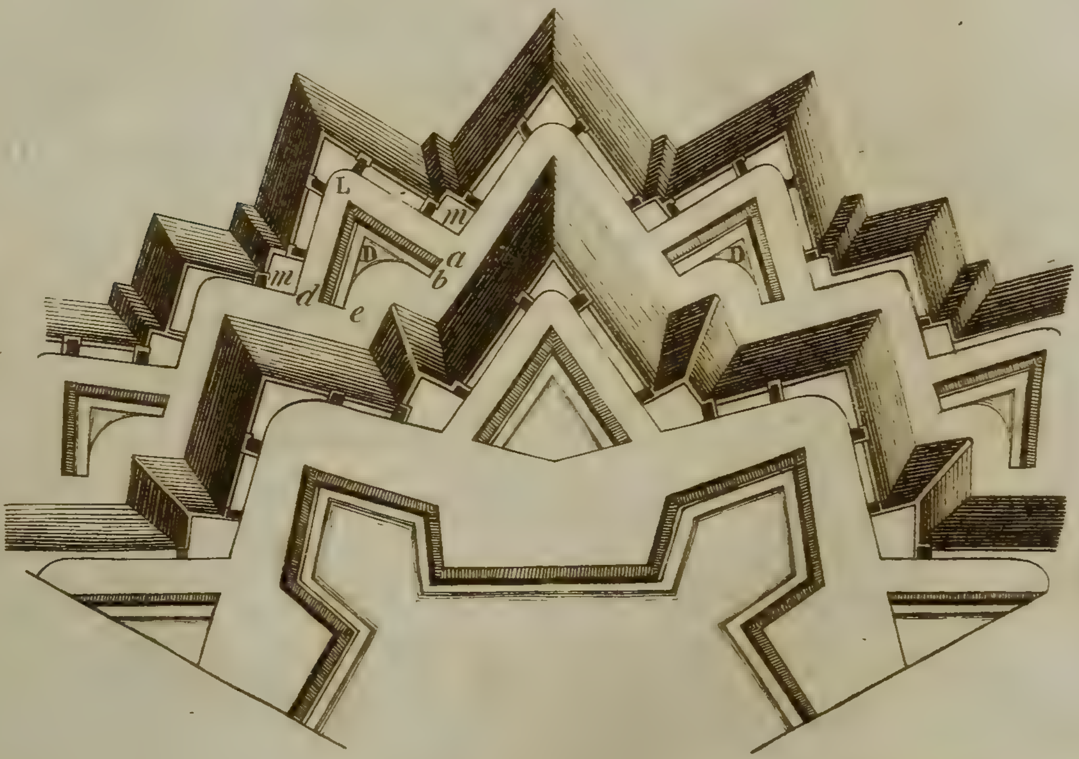


Fig. 4.



Thackara & Vallance Sc.

parapet of 3 toiſes thick, and 40 long; and the ditch before it 5 toiſes, terminating in a ſlope at both ends. The communication from the covert-way into theſe arrows is 4 or 5 toiſes wide; and there is a traverſe, *r*, at the entrance, of 3 toiſes thick, with a paſſage of 6 or 8 feet round it.

A detached redoubt is a kind of work much like a ravelin, with flanks placed beyond the glacis; ſuch as B: they are made in order to occupy ſome ſpot of ground which might be advantageous to the beſiegers; likewiſe to oblige the enemy to open their trenches farther off than they would do otherwiſe.

Their diſtance from the covert-way ought not to exceed 120 toiſes, that it may be defended by muſket-ſhot from thence.

The gorge *a b* is 40 toiſes; the flanks *a c*, *b f*, which are perpendicular to the gorge, 10; and the faces *c d*, *f d*, 30: the ditch before it is 6 toiſes, ending in ſlopes at both ends; the covert-way 4; the branches of the covert-way are 42 toiſes long, or thereabouts; the faces of the places of arms *y y*, which are perpendicular to the branches, 10; and the other which is parallel to them, 14.

The communication from the covert-way into the redoubt is 5 or 6 toiſes wide; and there is a traverſe made juſt at the entrance, and another in the middle when it is pretty long. The parapets of this communication terminate in a ſlope or glacis.

If theſe redoubts are above 50 toiſes diſtant from the covert-way the beſiegers carry their trenches round, and enter through the gorge; by which the troops that are in them are made priſoners of war, if they do not retire betimes; to prevent which, ſome other outworks ſhould be made to ſupport them.

11. *Conſtruction of Second Ditches and Covert-ways.*

Fig. 4. When the ground is low, and water to be found, there is often a ditch about 10 or 12 toiſes made round the glacis; and oppoſite to the places of arms are conſtructed lunettes, beyond the ditch: ſuch as D, whoſe breadth on the counterſcarp of the ditch is 10 toiſes, from *b* to *a*, and from *c* to *d*; and the faces *a* L, *d* L, are parallel to thoſe of the places of arms; the ditch before them is from 8 to 10 toiſes wide.

The ſecond covert-way is 4 toiſes, the ſemi-gorges of the places of arms, *m*, about 15, and the faces perpendicular to the counterſcarp; the ſecond glacis is from 15 to 18 toiſes broad.

This ſecond covert-way has traverſes every where, in the ſame manner as the firſt.

12. *Conſtruction of Profiles*

A PROFILE is the repreſentation of a vertical ſection of a work; it ſerves to ſhow thoſe dimenſions which cannot be repreſented in plans, and is neceſſary in the building of a fortification. Profiles are generally conſtructed upon a ſcale of 30 feet to an inch. It would be endleſs to deſcribe all their particular dimenſions; we ſhall therefore lay down the principal rules only, given by M. Vauban on this ſubject.

1. Every work ought to be at leaſt 6 feet higher than that before it, ſo that it may command thoſe before it; that is, that the garriſon may fire from all the works at the ſame time, with great and ſmall arms, at the beſiegers in their approaches. Notwithſtanding this ſpecious pretence, there are ſeveral authors who object againſt it. For, ſay they, if you can diſcover the enemy from all the works, they can diſcover, by the ſame reaſon, all the works from their batteries, ſo that they may deſtroy them without being obliged to change their ſituation, and thereby diſmount all the guns of the place before they come near it.

But if all the works were of the ſame height, thoſe within cannot be deſtroyed, till ſuch time as thoſe before them are taken: guns might be placed in the covert-way and outworks to obſtruct the enemy's approach; and when they come near the place, they might be tranſported into the inner-works: and as the body of the place would be much lower, the expence would be conſiderably diminiſhed.

But when works are low, they are eaſily enfiladed by the ricochet batteries, which is a kind of firing with a ſmall quantity of powder, by giving the gun an elevation of 10 or 12 degrees: this might however be partly prevented, by making the parapets near the ſaliant angles, for the ſpace of 8 toiſes on each ſide 5 or 6 feet higher than the reſt of the works.

2. The covert way ſhould be lower than the level-ground, otherwiſe the body of the place muſt be raiſed very high, eſpecially where there are ſeveral outworks: this is to be underſtood only when the works exceed each other in height, otherwiſe it need not be below the level.

3. The baſes of all inward ſlopes of earth ſhould be at leaſt equal to the height, if not more.

4. The baſes of all outward ſlopes of earth, two-thirds of their heights.

5. The ſlopes of all walls or revetments ſhould be one-fifth of their height; or one-ſixth might perhaps be ſufficient; the height of a wall is eſtimated from the bottom of the ditch, and not from the beginning of its foundation.

6. The ſlopes of all parapets and traverſes are one-ſixth of their breadth; that is, 3 feet towards the field; or the inſide, where the banquettes ſhould be 3 feet higher than the outſide.

7. When the revetment of a rampart goes quite up to the top, 4 feet of the upper part is a vertical wall of 3 feet thick, with a ſquare ſtone at the top of it projecting ſix inches; and a circular one below, or where the ſlope begins, of 8 or 10 inches diameter; they go quite round the rampart, and the circular projection is called the *cordon*.

Where the ſtraight part of the wall ends and the ſlope begins, the wall is always made 5 feet thick: and the counterforts or buttreſſes reach higher than that place.

8. When the rampart is partly walled and partly turfed, then one-fifth of the height which is turfed muſt be added to 5 feet, to get the thickneſs of the wall above.

And having the thickneſs of any wall above, by adding one-fifth of its height from the bottom of the ditch, the ſum will be the thickneſs of the wall at the bottom; but if a ſixth part is only taken for the ſlope, then a ſixth part muſt be added.

For inſtance, ſuppoſe a rampart of 30 feet high from the bottom of the ditch, and that 10 of which are to be turfed; then the fifth part of 10, which is 2, added to 5, gives 7 for the wall above; and as this wall is 20 feet high, the fifth of which is 4, and 4 added to the thickneſs 7 above, gives 11 for the thickneſs near the foundation.

Fig. 1. Repreſents, in military perſpective, the profiles of the body of a place, the ravelin and covert-way; which gives a clear idea of what is meant by a profile, and from which thoſe of all other works may be eaſily conceived.

SECT. II. *Of Irregular Fortification.*

The moſt eſſential principle in fortification conſiſts in making all the fronts of a place equally ſtrong, ſo that the enemy may find no advantage in attacking either of the ſides. This can happen no otherwiſe in a regular fortification ſituated in a plain or even ground: but as there are but few places which are not irregular either in their works or ſituations, and the nature of the ground may be ſuch as makes it impracticable to build them regular without too great expence; it is ſo much the more neceſſary to ſhow in what conſiſts the ſtrength or weakneſs of a town irregularly fortified, ſo that the weakeſt part may be made ſtronger by additional outworks; as likewiſe, if ſuch a place is to be attacked, to know which is the ſtrongeſt or weakeſt part.

1. *Conſtruction of an irregular place ſituated in an open country.*

If the place to be fortified is an old town, incloſed by a wall or rampart, as it moſt frequently happens, the engineer is to conſider well all the different circumſtances of the figure, ſituation, and nature of the ground; and to regulate his plan accordingly, ſo as to avoid the diſadvantages, and gain all the advantages poſſible: he ſhould examine, whether by cutting off ſome parts of the old wall or rampart, and taking in ſome ground, the place can be reduced into a regular figure, or nearly ſo; for if that can be done without increaſing the expence conſiderably, it ſhould by no means be omitted. Old towns have often towers placed from diſtance to diſtance, as Douay, Tournay, and many other places, which are generally made uſe of, and mended when it may be done. If there is a rampart, without baſtions or towers, it muſt be well conſidered whether baſtions may not be added, or if it is not better to make only ſome outworks: if the ditch about this rampart is not too wide and deep, it would be advantageous to make detached baſtions; otherwiſe ravelins and counterguards muſt be conſtructed. Special care muſt be taken to make all the ſides of the polygon as nearly equal as poſſible, and that the length of the lines of defence do not exceed the reach of muſket-ſhot; but if that cannot be done, thoſe ſides which are on the narroweſt part ſhould be made the longeſt.

If it ſhould happen that ſome of the ſides are inacceſſible or of very difficult approach, either on account of ſome precipice, marſhy ground, or inundation, they may be made much longer than the others which are of eaſy acceſs, and the flanks need not be ſo large as the reſt; by doing ſo, there will be ſome expences ſaved, which may be uſed in making the other ſides ſtronger by adding more outworks.

There are few ſituations but what are more advantageous in ſome parts than in others; it is therefore the buſineſs of an engineer to diſtinguiſh them and to render thoſe ſide ſtrong by art which are not ſo by nature.

If the ſituation is low and watery, lunettes or tenaillons, and ſuch other ſmall outworks, ſhould be conſtructed; becauſe they are not of any great expence, and may make a very good defence. But if one ſide of the place only is low, and running water is to be had, a ſecond ditch and covert-way with lunettes may be made, by obſerving that if the firſt glacis is made to ſlope, ſo as to become even with the level of the water in the ſecond ditch; or if the water can be ſwelled by means of dykes or ſluices, ſo as to overflow the beſt part of the firſt glacis, it ſhould be done; for by ſo doing theſe works will be able to make a very good defence, ſince the beſiegers will find it a difficult matter to lodge themſelves upon this glacis; which cannot be done but within a few toiſes of the firſt covert-way, where the beſieged are ready to receive them, and to deſtroy their works with great advantage; whereas the enemy cannot ſupport their workmen but from the ſecond covert-way, which is too far off to be of any great ſervice to them.

But if the ſituation is of a dry nature, without any water about it, caponiers ſhould be made in the great ditch, from the curtains to the ravelin, and batteries raiſed in the entrance of the ditch before the ravelin, whoſe parapet muſt ſlope off into a glacis ſo as to afford no cover for the enemy behind them. Arrows and detached redoubts are likewiſe very proper to be uſed in ſuch a caſe; and ſometimes horn or crown works, if it ſhould be thought convenient: but theſe works ſhould never be conſtructed without an abſolute neceſſity, either to occupy a ſpot of ground which might be advantageous to the enemy, or to cover ſome gate or entrance into the town; for they are of great expence, and their defence ſeems not to be anſwerable to it.

Moſt of the places in Flanders are fortified with horn-works, ſuch as Ipres, Tournay, Lille, and others.

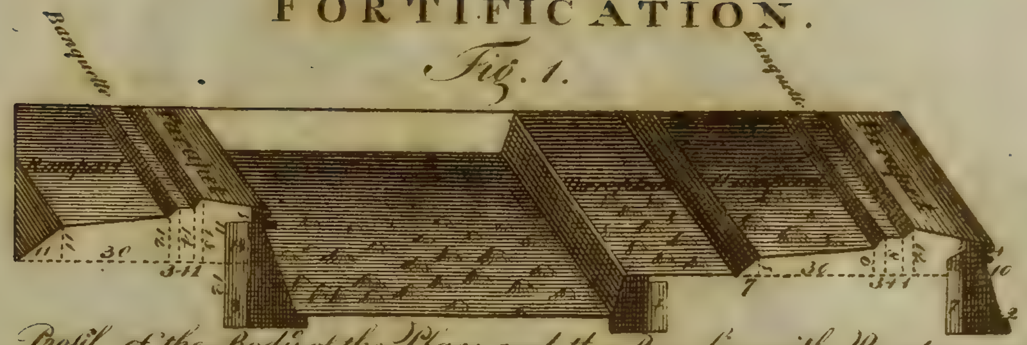
If the place to be fortified is new, and the ſituation will not admit of a regular conſtruction, particular care muſt be taken in chooſing ſuch a ſpot of ground as is moſt advantageous, and leaſt liable to any diſadvantages either in the building or in the maintaining of it. All hills or riſing grounds ſhould be avoided, which might command any part of the works; marſhy grounds, becauſe ſuch ſituations are unwholeſome; or lakes and ſtanding waters for the ſame reaſon, excepting a lake is or may be made navigable. Good water ſhould be had either within the place or near it, for it is abſolutely neceſſary for men and cattle; the air ſhould be wholeſome; otherwiſe the continual ſickneſs that may reign in ſuch a place might prevent people from coming to live in it, and the garriſon would not be in a condition to defend themſelves as they ought to do. In ſhort, all the different circumſtances attending ſuch an undertaking ſhould be maturely conſidered before a reſolution is taken to fortify any place.

When a ſituation is fixed upon, the next thing to be conſidered is, the bigneſs of the town and the number of its outworks; which muſt abſolutely depend upon the conſequence ſuch a place is of to a nation. If it is only to guard a paſs or entrance into a country, it need not be ſo large: but if it is to be a place either to

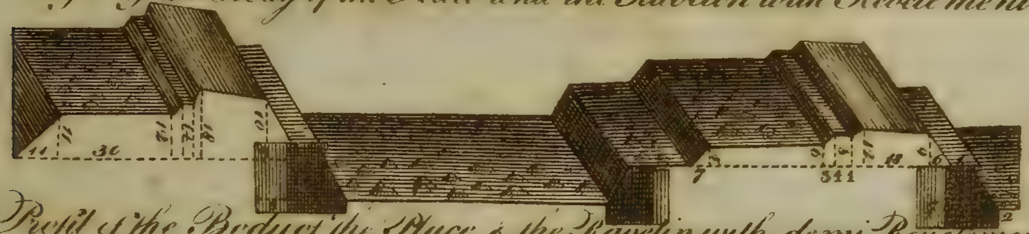
FORTIFICATION.

Plate CXCIX.

Fig. 1.



Profil of the Body of the Place and the Ravelin with Revetement.



Profil of the Body of the Place & the Ravelin with demi Revetement.

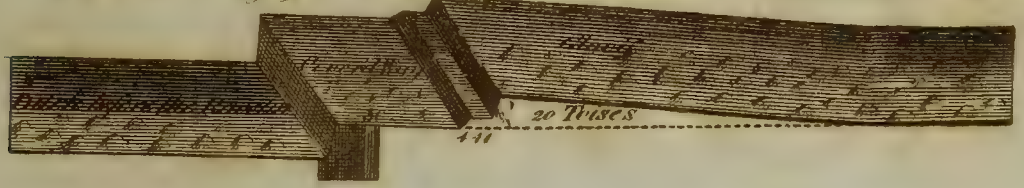


Fig. 2.

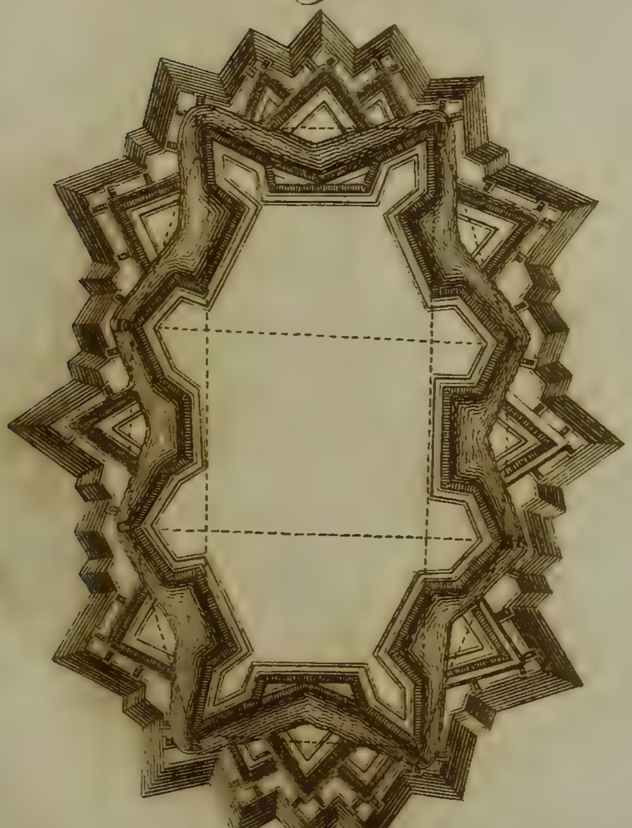
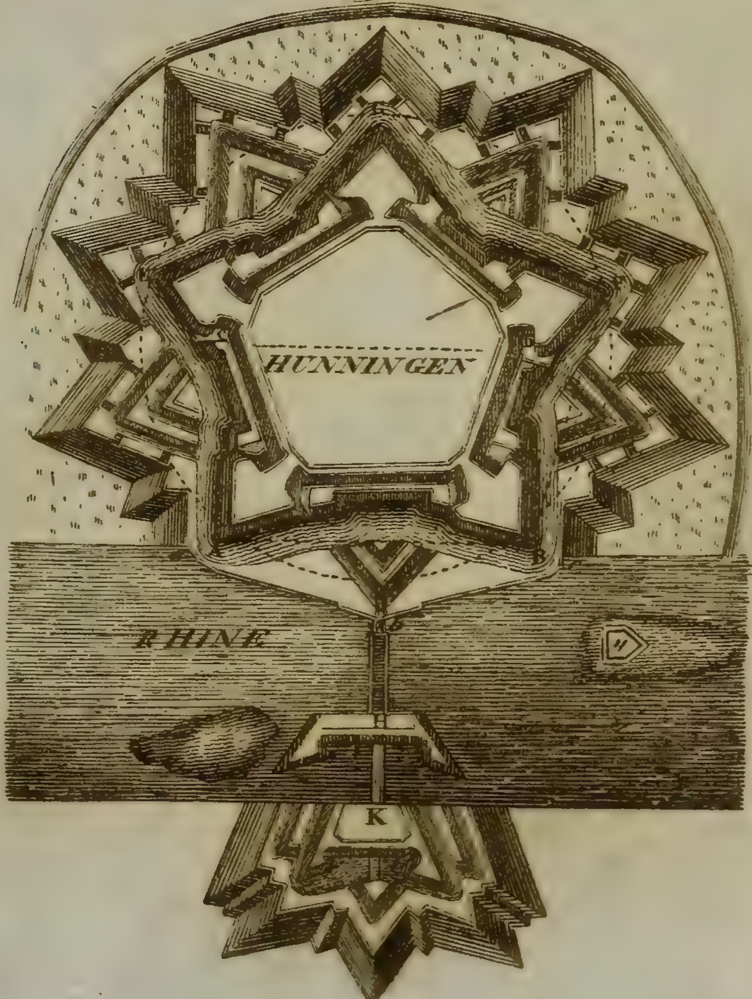


Fig. 3.



Of Irregular Fortification.

Plate CXCIX.

promote or to protect trade, it ſhould be large and commodious: the ſtreets ſhould be wide, and the buildings regular and convenient. As to what regards the fortification, its conſtruction ſhould depend on the nature of the ſituation, and the number of works, on the funds or expence a prince or a nation will be at; which, however, ought to be according to the benefit ariſing from ſuch a place: for as ſuch undertakings are of very great expence, an engineer cannot be too ſparing in his works; on the contrary, the greateſt economy ſhould be uſed both in regard to the number of works and to the conſtruction. The body of the place may have (A) revetments quite up to the top, or only in part, and the reſt turfed; but as to the outworks, they ſhould have half revetments, or they may be made with turf only: as being not ſo neceſſary to prevent the place from being ſurpriſed, which may nevertheleſs make a good defence.

Fig 2. is the plan of an octagon, one half of which is ſimilar and equal to the other half; it being ſuppoſed, that the ſituation would not admit of fortification quite regular. The exterior ſides are each 180 toiſes, and the works are conſtructed according to our method: but becauſe the ſides AB, EF, are weaker than the reſt, as has been proved before, we have added tenailles, redoubts in the ravelins, and lunettes, to render them nearly equal in ſtrength with the others; and if counter-guards were made before the baſtions A and B, it would effectually ſecure that front. Inſtead of lunettes, any other works may be made, as may be thought convenient and according to the nature of the ground. If it ſhould be judged neceſſary to add other outworks to the ravelins all round the place, care muſt be taken to add likewiſe more to the fronts AB, EF, in order to render the advantages and diſadvantages of attacking on either ſide equal.

2. *Conſtruction of an irregular place ſituated on a hill or rock.*

In the conſtruction of ſuch places, care muſt be taken that no neighbouring hill commands any part of the works. The town ſhould always be built on the higheſt part; but if it ſhould be thought more convenient to place it lower, then the upper part muſt be fortified with a fort. The ſituation ſhould be made level as near as poſſible, by removing the earth from ſome places to fill up others; and if it cannot well be levelled without extraordinary expence, works muſt be made on the higheſt part, ſo as to command and protect the lower. The works ought to occupy all the upper part of the hill; but if it ſhould be too extenſive to be all incloſed, or ſo irregular as not to be fortified without great inconvenience, the parts which fall without ſhould be fortified with ſome detached works, and a communication with the place muſt be made either above or under ground. There ſhould be no cavity or hollow roads within cannon-ſhot round about the place, where the enemy might be able to approach under cover. If there ſhould happen to be a ſpring near the top of the hill, it ſhould be incloſed in the fortification; or if that cannot be done, by ſome work or other: for there is nothing more neceſſary, and at the ſame time ſcarcer, in ſuch ſituations, than water; for which reaſon there cannot be too much care in providing it: ſeveral ciſterns are to be made to receive the rain-water, and to preſerve it; wells ſhould be dug likewiſe, though ever ſo deep, the water of which will ſerve for common uſe.

Of Irregular Fortification.

Plate CXCIX.

Places built on hills or rocks ſhould never be large; for their uſe is generally to guard paſſes or inlets into a country, and are ſeldom uſeful in traffic; and it is a difficult matter to provide for a large garriſon in ſuch ſituations, neither ſhould any ſuch place be built without ſome very material reaſons: but when it is abſolutely neceſſary, great care and precaution ſhould be taken to render the works as perfect as the ſituation will admit of, and at the ſame time to be as frugal in the expence as poſſible.

3. *Conſtruction of irregular fortifications ſituated near rivers, lakes, or the ſea.*

As the intent of building theſe kind of places is chiefly to facilitate and protect trade, they are of more importance than any other kind, eſpecially in maritime countries, where the principal ſtrength and power depends on them: for which reaſon we ſhall treat of this conſtruction more largely than of any other.

The firſt thing to be conſidered is their ſituation, which ought to be ſuch as to afford a good harbour for ſhipping, or a ſafe and eaſy entrance in ſtormy weather; but as it is hardly poſſible to find any where ſhips may go in and lie ſecure with all winds, care ſhould be taken to make them ſafe to enter with thoſe winds which are moſt dangerous: but it is not ſufficient that the harbour is ſafe againſt ſtormy weather, they ſhould likewiſe be ſo againſt an enemy both by land and water; for it often happens, that ſhips are deſtroyed where it was imagined they were ſecure, which is of too great conſequence not to be provided againſt; for which reaſon, forts or batteries muſt be built in the moſt convenient places, to prevent the enemy's ſhips from coming too near, ſo as to be able to cannonade thoſe in the harbour, or fling ſhells among them; and if there is any danger of an enemy's approach by land, high ramparts and edifices muſt be built, ſo as to cover them.

When a river is pretty large, and it is not convenient for making a harbour without great expence, the ſhips may ride along the ſhore; which, for that reaſon, muſt be made acceſſible for ſhips of burthen: this may be done by advancing the quay into the river if the water is too ſhallow, or by digging the river ſufficiently deep for that purpoſe.

And to prevent an enemy from coming up the river, forts muſt be built on both ſides, eſpecially where there are any turnings or windings. Antwerp is ſuch a place: for the Scheldt is ſufficiently deep to carry ſhips of great burden, which may come quite near the town-wall; and ſeveral forts are built below it on both ſides, ſo that it would not be an eaſy matter for an enemy to come up the river.

When the river is but ſmall, ſo that no ſhips of burden

(A) Revetments are chiefly made to prevent a place from being ſurpriſed: outworks do not want to be made ſo; the taking them by ſurpriſe is of no great conſequence, except in a ſiege, when other cautions are uſed to prevent it.

den can come through it, it is ſufficient to make it run through ſome of the works, where proper landing-places are contrived, from whence the goods may be carried in to the place ; as at Sarrelouis, where a hornwork is built beyond the Sarre, in the gorge of which the goods are landed.

If the breadth of the river does not exceed 200 yards, it commonly paſſes through the middle of the town, and proper quays are made on each ſide ; in ſuch a caſe, the fortification is ſo contrived, as that the river paſſes through the curtain, in order to have a baſtion on each ſide to defend the coming in and going out.

When M. Vauban fortified near rivers, he made always the exterior ſide near the water much longer than any of the others : ſuch as Hunninghen on the Rhine, and Sarrelouis on the Sarre ; but for what reaſon he fortified theſe places in that manner, has not been told by any author.

But it is plain that the ſides which terminate at the river are the weakeſt ; becauſe the beſiegers trenches being ſecured by the river, they may draw moſt of their troops off, and act therefore with more vigour and ſtrength on the other ſide : beſides, as the ſtrength of a ſide increaſes in proportion as the angle of the polygon is greater, by making the ſide next the river longer, the angles at its extremities become wider, and conſequently the adjacent ſides ſtronger.

There are other advantages, beſides thoſe mentioned already, which ariſe from the lengthening that ſide: for if the river is pretty deep ſo as not to be fordable, that ſide is not liable to be attacked ; and by increaſing its length, the capacity of the place increaſes much more in proportion to the expence, than if more ſides were made ; the centre of the place will be likewiſe nearer the river, which makes it more convenient for tranſporting the goods from the water-ſide to any part of the town.

Fig. 3. To illuſtrate this method of M. Vauban's we ſhall give the plan of Hunninghen : this place was built for the ſake of having a bridge over the Rhine, for which reaſon he made it only a pentagon ; the ſide AB next to the river is 200 toiſes, and each of the others but 180.

About the ſpace *a b c*, which lies before the front AB, is a ſtone wall ; and the paſſages *x x* are ſhut up with ſluices, to retain the water in the ditches in dry ſeaſons : and to prevent an enemy from deſtroying the ſluice near the point *c*, whereby the water would run out and leave the ditches dry, the redoubt *y* was built in the little iſland hard by, in order to cover that ſluice ; without which precaution the place might be inſulted from the river ſide, where the water is ſhallow in dry ſeaſons.

The hornwork K beyond the Rhine was built to cover the bridge ; but as this work cannot be well defended croſs the river, the hornwork H was made to ſupport the other.

Before finiſhing the deſcription of this plan, we ſhall ſhow how to find the long ſide AB.

After having inſcribed the two ſides GE, GF, in a circle, draw the diameter CD, ſo as to be equally diſtant from the line joining the points E F that is parallel to it. On this diameter ſet off 100 toiſes on each ſide of the centre ; from theſe points draw two indefinite perpendiculars to the diameter ; then if from the points EF, as centres, two arcs are deſcribed with a radius of 180 toiſes, their interſections, A and B, with the ſaid perpendiculars, will determine the long ſide AB, as likewiſe the other two FB and EA. In like manner may be found the long or ſhort ſide of any polygon whatſoever.

When a place near a river is to be fortified for the ſafety of commerce, particular care ſhould be taken in leaving a good ſpace between the houſes and the water-ſide, to have a key or landing place for goods brought by water ; it ſhould alſo be contrived to have proper places for ſhips and boats to lie ſecure in ſtormy weather, and in time of a ſiege ; and as water-carriage is very advantageous for tranſporting goods from one place to another, as likewiſe for bringing the neceſſary materials, not only for building the fortifications, but alſo the place itſelf, the expences will be leſſened conſiderably when this convenience can be had ; for which reaſon, places ſhould never be built any where elſe but near rivers, lakes, or the ſea ; excepting in extraordinary caſes, where it cannot be avoided.

Fortin ‖ Fortitude.

FORTIN, Fortelet, or *Field-fort*, a ſconce or little fort, whoſe flanked angles are generally 120 fathoms diſtant from one another.

The extent and figure of fortins are different, according to the ſituation and nature of the ground ; ſome of them having whole baſtions, and others demi-baſtions. They are made uſe of only for a time, either to defend the lines of circumvallation, or to guard ſome paſſage or dangerous poſt.

FORTISSIMO, in muſic, ſometimes denoted by FFF, or *fff*, ſignifies, to ſing or play very loud or ſtrong.

FORTITUDE, a virtue or quality of the mind, generally conſidered as the ſame with Courage ; tho' in a more accurate ſenſe they ſeem to be diſtinguiſhable. Courage may be a virtue or a vice, according to circumſtance ; *fortitude* is always a virtue ; we ſpeak of deſperate courage, but not of deſperate fortitude. A contempt or neglect of danger, without regard to conſequences, may be called *courage* ; and this ſome brutes have as well as we : in them it is the effect of natural inſtinct chiefly ; in man it depends partly on habit, partly on ſtrength of nerves, and partly on want of conſideration. But fortitude is the virtue of a rational and conſiderate mind, and is founded in a ſenſe of honour and a regard to duty. There may be courage in fighting a duel, though that folly is more frequently the effect of cowardice : there may be courage in an act of piracy or robbery ; but there can be no fortitude in perpetrating a crime. Fortitude implies a love of equity and of public good : for, as Plato and Cicero obſerve, courage exerted for a ſelfiſh purpoſe, or without a regard to juſtice, ought to be called audacity rather than fortitude.

Fortitude.

This virtue takes different names, according as it acts in oppoſition to different ſorts of evil; but ſome of thoſe names are applied with conſiderable latitude. With reſpect to danger in general, fortitude may be termed *intrepidity;* with reſpect to the dangers of war, *valour;* with reſpect to pain of body or diſtreſs of mind, *patience;* with reſpect to labour, *activity;* with reſpect to injury, *forbearance;* with reſpect to our condition in general, *magnanimity*.

Fortitude is very becoming in both ſexes; but courage is not ſo ſuitable to the female character: for in women, on ordinary occaſions of danger, a certain degree of timidity is not unſeemly, becauſe it betokens gentleneſs of diſpoſition. Yet from thoſe of very high rank, from a queen or an empreſs, courage in emergencies of great public danger would be expected, and the want of it blamed; we ſhould overlook the ſex, and conſider the duties of the ſtation. In general, however, maſculine boldneſs in a woman is diſagreeable; the term *virago* conveys an offenſive idea. The female warriors of antiquity, whether real or fabulous, Camilla, Thaleſtris, and the whole community of AMAZONS, were unamiable perſonages. But female courage exerted in defence of a child, a huſband, or a near relation, would be true fortitude, and deſerve the higheſt encomiums.

The motives to fortitude are many and powerful. This virtue tends greatly to the happineſs of the individual, by giving compoſure and preſence of mind, and keeping the other paſſions in due ſubordination. To public good it is eſſential; for without it, the independence and liberty of nations would be impoſſible. It gives to a character that elevation which poets, orators, and hiſtorians, have in all ages vied with one another to celebrate. Nothing ſo effectually inſpires it as rational piety; the fear of God is the beſt ſecurity againſt any other fear. A true eſtimate of human life; its ſhortneſs and uncertainty; the numberleſs evils and temptations to which by a long continuance in this world we muſt unavoidably be expoſed; ought by no means to diſcourage or to throw any gloom on our future proſpects: they ſhould teach us, that many things are more formidable than death; and that nothing is loſt, but much gained, when, by the appointment of Providence, a well-ſpent life is brought to a concluſion.

Let it be conſidered too, that puſillanimity and fearfulneſs can never avail us any thing. On the contrary they debaſe our nature, poiſon all our comforts, and make us deſpicable in the eyes of others; they darken our reaſon, diſconcert our ſchemes, enfeeble our efforts, extinguiſh our hopes, and add tenfold poignancy to all the evils of life. In battle, the brave ſoldier is in leſs danger than the coward; in leſs danger even of death and wounds, becauſe better prepared to defend himſelf; in far leſs danger of infelicity; and has before him the animating hope of victory and honour. So in life, the man of true fortitude is in leſs danger of diſappointment than others are, becauſe his underſtanding is clear, and his mind diſencumbered; he is prepared to meet calamity without the fear of ſinking under it; and he has before him the near proſpect of another life, in which they who piouſly bear the evils of this will obtain a glorious reward.

FORTUNA, a goddeſs worſhipped with great devotion by the ancient Greeks and Romans; who believed her to preſide over human affairs, and to diſtribute wealth and honour at her pleaſure. See FORTUNE.

FORTUNATE-ISLANDS, in ancient geography, certain iſlands (concerning the ſituation of which authors are not agreed) famous for the golden apples of the HESPERIDES.—The common opinion is, that they are the *CANARY Iſlands*.

FORTUNE (Τυχη), a name which among the ancients ſeems to have denoted a principle of fortuity, whereby things came to paſs, without being neceſſitated thereto: but what and whence that principle is, they do not ſeem to have ever preciſely thought.—Hence their philoſophers are often intimating, that men only framed the phantom *Fortune* to hide their ignorance; and that they call *Fortune* whatever befals a man without his knowing for what purpoſe. Hence Juvenal (ſat. x. ver. 366.) affirms, there were men who made a deity of Fortune.

Nullum numen abeſt, ſi ſit prudentia; ſed te
Nos facimus, Fortuna, deam, cæloque locamus.

The ingenious Mr Spence gives another reading of this paſſage:

Nullum numen habes, ſi ſit prudentia; ſed te
Nos facimus, Fortuna, deam cæloque locamus.

This reading, he thinks, agrees beſt with the context: Juvenal ſays, ver. 356. that the two things we ſhould pray for are good health and good ſenſe, that we might be the authors of our own happineſs if we pleaſed, ver. 363; that virtue is the only way to true happineſs, ver. 364; that if we ourſelves are prudent, Fortune has no power over us; and that, in truth, ſhe is no goddeſs at all, and has only uſurped a ſeat in heaven from the folly of mankind, ver. 366. Fortune was not conſidered as a deity by the old Romans, but was made ſo by the devotion and folly of the vulgar; and Mr Spence ſays, that he has ſeen an ancient gem, in which Cybele, the mother of the gods, is repreſented as turning away her head from Fortune, in an attitude of diſowning and rejecting her; (Polymetis, p. 150, 154. &c.)

According to the opinion of the heathens, therefore, fortune in reality was only the arrival of things in a ſudden and unexpected manner, without any apparent cauſe or reaſon: ſo that the philoſophical ſenſe of the word coincides with what is vulgarly called *chance*.

But in religion it had a farther force; altars and temples in great numbers were conſecrated to this Fortune, as a deity. This intimates, that the heathens had perſonified, and even deified, their chance; and conceived her as a ſort of goddeſs, who diſpoſed of the fate of men at her pleaſure. Hence that invocation of Horace, *O diva, gratum quæ regis Antium*, in the 35th ode of the firſt book, where he recommends Auguſtus, then preparing for a viſit to Britain, to her protection. From theſe different ſentiments it may be inferred, that the ancients at one time took Fortune for a peremptory cauſe, bent upon doing good to ſome, and perſecuting others; and ſometimes for a blind inconſtant cauſe, without any view or determination at all.

If then the word *fortune* had no certain idea in the mouth of thoſe who erected altars to her, much leſs can it be aſcertained what it denotes in the mind of thoſe who now uſe the word in their writings. They who would ſubſtitute the name *Providence* in lieu of that of *Fortune*, cannot give any tolerable ſenſe to half the phraſes wherein the word occurs.

Horace paints the goddeſs, preceded by Neceſſity, holding nails and wedges in her hands, with a cramp-iron, and melted lead to faſten it; rarely accompanied with Fidelity, unleſs when ſhe abandons a family; for in that caſe Fidelity never fails to depart with her, as well as friends.

She is diſreſpectfully ſpoken of by moſt of the Roman writers, and repreſented as blind, inconſtant, unjuſt, and delighting in miſchief, (*Ovid ad Liv.* ver. 52. ver. 374. *Hor.* lib. i. od. 34. ver. 26. lib. iii. od. 29. ver. 51. *Statius,* Theb. xii. ver. 505.) However, they had a good as well as a bad Fortune, a conſtant and inconſtant Fortune; the latter of which was repreſented with wings, and a wheel by her, (*Hor.* lib. iii. od. 29. ver. 56.) Juvenal alludes to a ſtatue of Fortune, which exhibited her under a very good character, as the patroneſs of the poor infants that were expoſed by their parents in the ſtreets, (*Sat.* vi. ver. 605.)

The painters repreſent her in a woman's habit, with a bandage before her eyes, to ſhow that ſhe acts without diſcernment, and ſtanding on a wheel, to expreſs her inſtability. The Romans, ſays Lactantius, repreſented her with a cornucopia, and the helm of a ſhip, to ſhow that ſhe diſtributes riches, and directs the affairs of the world. In effect, it is with ſuch characters that we ſee her repreſented on ſo many medals, with the inſcriptions, FORTVNA AVG. FORTVNA REDVX. FORTVNÆ AVG. or REDVCIS, &c. Sometimes ſhe is ſeen pointing at a globe before her feet, with a ſceptre in one hand, and holding the cornucopia in the other.

The Romans had a virile as well as a muliebrian Fortune, for the objects of their adoration: the *Fortuna virilis* was honoured by the men, and the *Fortuna muliebris* by the women. They honoured Fortune alſo under a variety of other appellations.

The Romans derived the worſhip of Fortune from the Greeks, under the reign of Servius Tullius, who dedicated the firſt temple to her in the public market. Nero alſo built a temple to Fortune. The Fortune worſhipped at Antium was probably of the moſt exalted character of any among the Romans; if we may judge by the account which Horace gives us of the great ſolemn proceſſions that were made to her, (*Hor.* lib. i. od. 35. ver. 22.) But the moſt celebrated temple of Fortune was at Præneſte. Statius ſpeaks of ſeveral Fortunes there, and calls them the *Præneſtinæ ſorores*, (Lib. i. Sylv. iii. ver. 80.)

Fortune-Tellers. Perſons pretending to tell fortunes are to be puniſhed with a year's impriſonment, and ſtanding four times on the pillory. Stat. 9 Geo. II. c. 5.

FORTY-DAYS *Court,* the court of *attachment* or *woodmote,* held before the verderors of the foreſt once every forty days, to inquire concerning all offenders againſt vert and veniſon. See ATTACHMENT.

FORUM, in Roman antiquity, a public ſtanding place within the city of Rome, where cauſes were judicially tried, and orations delivered to the people.

FORUM was alſo uſed for a place of traffic, anſwering to our market-place. Theſe were generally called *fora venalia*; in contradiſtinction to the former, which were called *fora civilia.*

The *fora civilia* were public courts of juſtice, very magnificent in themſelves, and ſurrounded with porticos and ſtately edifices; of theſe there were ſix very remarkable: 1. *Forum Romanum.* 2. *Julianum.* 3. *Auguſtum.* 4. *Palladium.* 5. *Forum Trajani.* 6. *Forum Saluſtii.* The *Forum Romanum* was the moſt noted, and is often called ſimply *Forum,* by way of eminence. Here was the pleading-place called *Roſtra,* the *Comitium,* the ſanctuary of *Saturn,* temple of *Caſtor,* &c. See ROSIRA, COMITIUM, &c.

The *fora venalia,* or market-places, were very numerous. The chief of them were the *forum boarium* for oxen or beef; *ſuarium* for ſwine; *piſtorium* for bread; *cupedinarium* for dainties; *olitorium* for garden ſtuff.

The Grecian Αγοραι exactly correſponds with the Roman *fora,* being places where courts and markets were held. At Athens they had many *fora,* but the chief of them were the *old* and the *new.*

Forum Indicere, was the act of the prætor appointing the place in Rome where cauſes were to be tried. *Agere forum* denoted the bringing on cauſes out of Rome, in a Roman province (Cicero, Suetonius); the ſame with *agere conventum* (Florus).

The term *forum* added to a proper name, denoted ſome market town or borough; as,

Forum Alieni, a place mentioned only by Tacitus; and, from what he ſays of it, thought to be *Ferrara,* capital of the duchy of that name in Italy. E. Long. 12. 5. N. Lat. 44. 46.

Forum Apii (Cicero, Luke); a town of the Volſci, in Latium, on the Via Appia, a little beyond the Tres Tabernæ; ſet down in the Jeruſalem Itinerary as ſituated near the river Nymphæus: now entirely extinct.

Forum Cornelii, a town of the Ciſpadana, built by Sylla: Now *Imola,* a city in the Romania, and territory of the pope. E. Long. 12. 12. N. Lat. 44. 30.

Forum Domitii, a town of Gallia Narbonenſis; probably built by Ahenobarbus Domitius, who commanded in thoſe parts: Now *Frontignan,* or *Frontigniac,* in Languedoc, near the Mediterranean. E. Long. 3. 30. N. Lat. 43. 30.

Forum Fulvii, a town of Liguria, ſurnamed *Valentinum*; from which it is conjectured that it is now *Valenza,* in the duchy of Milan; which is confirmed by Peutinger's diſtances. E. Long. 9°. N. Lat. 45°.

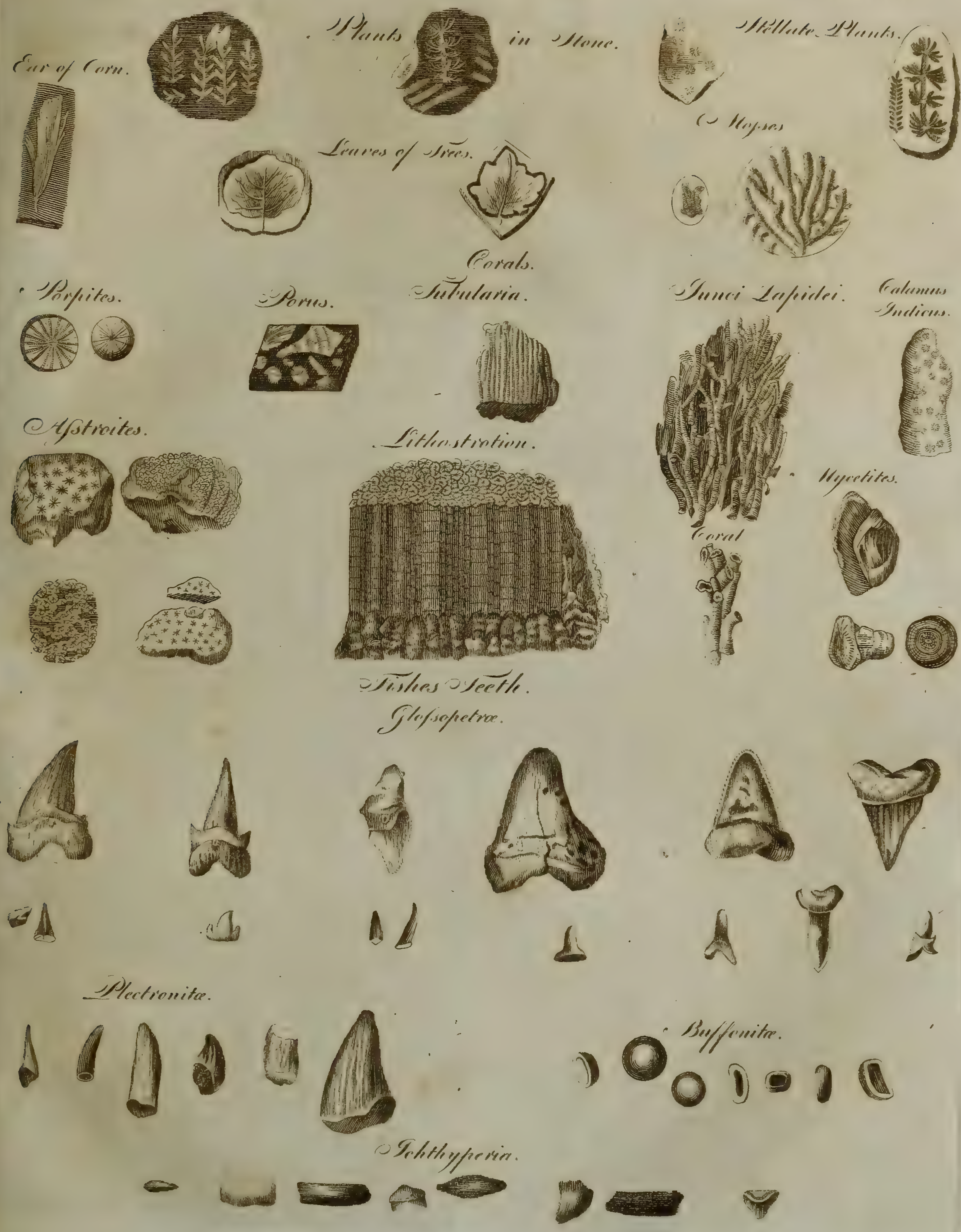
Forum Gallorum, a ſmall town of the Ciſpadana, on the Via Emilia, eight miles from Mutina, beyond the river Scultenna. Here Antony defeated Panſa, and was in his turn defeated by Hirtius: Now *Caſtelfranco,* in the territory of Bologna.—Another *Forum Gallorum,* a town of the Vaſcones in the Hither Spain: Now *Gurrea,* a ſmall town of Arragon.

Forum Julium. There are ſeveral towns of this name; as a *Forum Julium,* of Gallia Narbonenſis; or *Forojulium:* Now *Frejus,* or *Frejules,* in Provence, at the mouth of the Argens. *Forum Julium Carnorum,* to the north of Aquileia, in the Tranſpadana; Now *Cividal di Friuli,* formerly *Cividal d'Auſtria,* in the territory of Venice.

Forum Jutuntorum, a town of the Inſubres, in the Tranſpadana: Now *Crema,* capital of the Cremaſco,

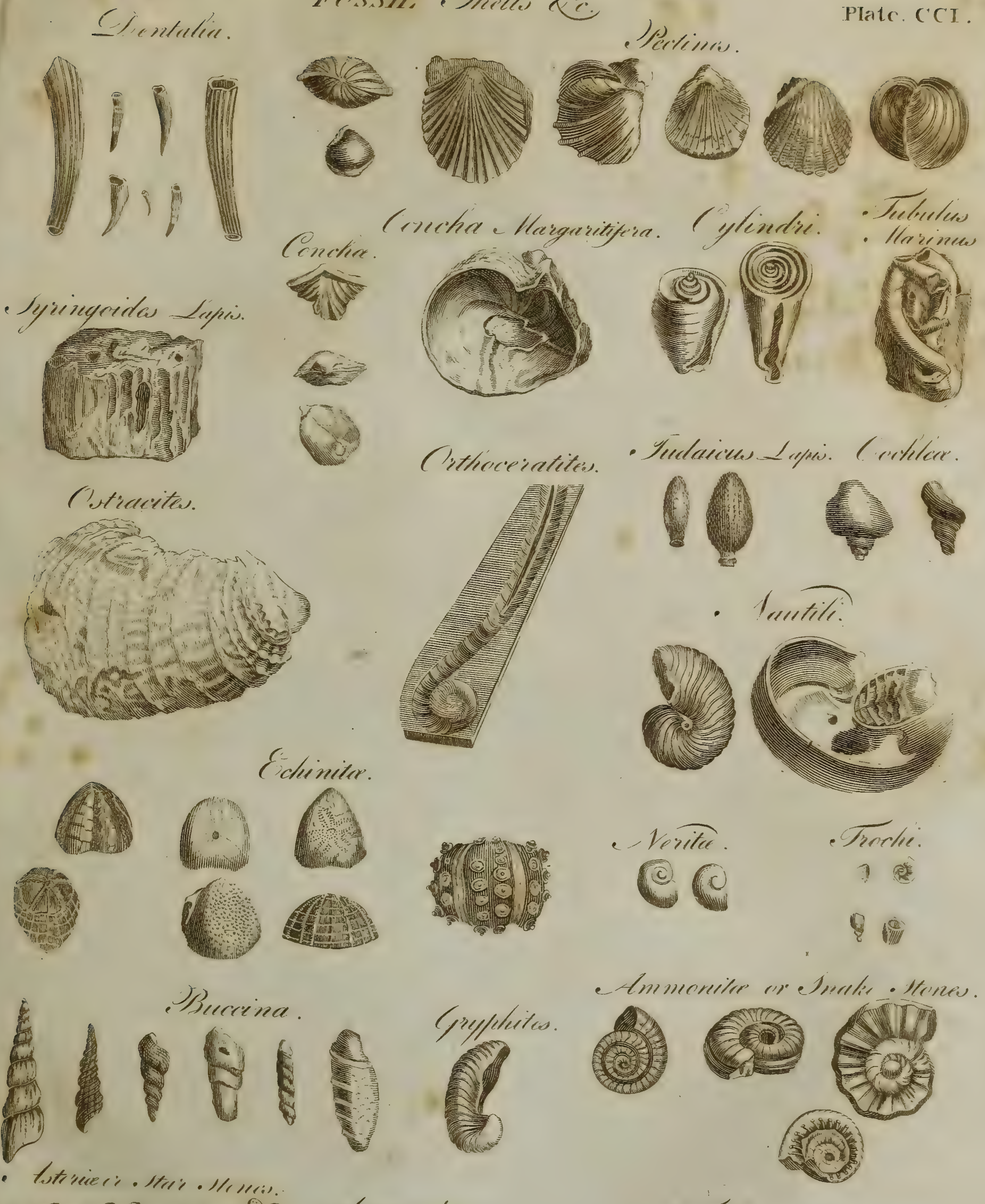
FOSSILS Extraneous.

Plate CC.



FOSSIL Shells &c.

Plate. CCI.



in the territory of Venice. E. Long. 10. 15. N. Lat. 45. 20.

Forum *Livii*, a town of the Semnones, in the Ciſpadana: Now *Forli*, in Romania. E. Long. 12. 45. N. Lat 44. 25.

Forum *Seguſianorum*, ſituated on the eaſt ſide of the Liger, in Gallia Celtica: Now *Feurs*, on the Loire, in the Lionnois, capital of the territory of Forez. E. Long. 4. 15. N. Lat. 45. 44.

Forum *Tiberii*, a town of the Pagus Tigurinus, in Belgica, on the left or ſouth ſide of the Rhine: Now *Kayſerſtull*; literally the tribunal of Tiberius, which he held there when commander in the Rhetian war.

Forum *Vulcani* (Strabo): the *Campi Phlegraei* of Pliny: a plain in Campania, encompaſſed with rocky eminences, near Puteoli, and diſtant from it two miles towards Naples, emitting ſmoke, and in ſome places flame, like a large extenſive furnace, and yielding ſulphur: Now called *Solfatara*, in the Terra di Lavoro.

Forum, is alſo uſed, among caſuiſts, &c. for juriſdiction: thus they ſay, *In foro legis*, &c.

FOSS, or Fosse, in fortification, &c. a ditch or moat. The word is French, formed of the Latin participle *foſſum*, of the verb *fodio* "I dig."

Foss, *Foſſa*, in anatomy, a kind of cavity in a bone, with a large aperture, but no exit or perforation. When the aperture is very narrow, it is called a *ſinus*.

Foss is particularly uſed for the cavity or denture in the back part of the neck.

FOSSA magna, or navicularis, is an oblong cavity, forming the inſide of the *pudendum muliebre*, and which preſents itſelf upon opening the labia; and in the middle whereof are the *carunculæ myrtiformes*. See Anatomy, p. 470.

Fossa, in our ancient cuſtoms, was a ditch full of water, where women committing felony were drowned; as men were hanged: *Nam et ipſi in omnibus tenementis ſuis omnem ab antiquo legalem habuere juſtitiam, videlicet ferrum, foſſam, furcas, et ſimilia.* In another ſenſe it is taken for a grave, as appears by theſe old verſes:

Hic jacent in foſſa Bedæ venerabilis oſſa;
Hic eſt foſſatus, qui bis erat hic cathedratus.

Foſs-way was anciently one of the four great Roman high-ways of England: ſo called, according to Cambden, becauſe it was ditched on both ſides, which was the Roman method of making highways.

FOSSARII, in antiquity, a kind of officers in the eaſtern church, whoſe buſineſs was to inter the dead.

Ciaconius relates, that Conſtantine created 950 foſſaries, whom he took out of the divers colleges or companies of tradeſmen: he adds, that they were exempted from taxes, ſervices, burdenſome offices, &c.

F. Goar, in his notes on the Greek Euchologion, inſinuates that the foſſarii were eſtabliſhed in the times of the apoſtles; and that the young men, who carried off the body of Ananias, and thoſe perſons full of the fear of God who interred St Stephen, were of the number.

St Jerom aſſures us, that the rank of foſſarii held the firſt place among the clerks; but he is to be underſtood of thoſe clerks only who had the direction and intendance of the interment of the devout.

FOSSE, the Roman Military-way in South Britain, begins at Totneſs, and paſſes through Exeter, Ivelcheſter, Shepton-Mallet, Bath, Cirenceſter, Leiceſter, the Vale of Belvoir, Newark, Lincoln, to Barton upon the Humber, being ſtill viſible in ſeveral parts, tho' of 1400 years ſtanding. It had the name from the foſſes or ditches made by the ſides of it.

FOSSIL, in natural hiſtory, denotes, in general, every thing dug out of the earth, whether they be natives thereof, as metals, ſtones, ſalts, earths, and other minerals; or extraneous, repoſited in the bowels of the earth by ſome extraordinary means, as earthquakes, the deluge, &c. See Metal, Stone, &c.

Plates CC & CCI.

Native foſſils, according to Dr Hill, are ſubſtances found either buried in the earth, or lying on its ſurface of a plain ſimple ſtructure, and ſhowing no ſigns of containing veſſels or circulating juices. Theſe are ſubdivided by the ſame author, 1. Into foſſils naturally and eſſentially ſimple. Of theſe, ſome are neither inflammable nor ſoluble in water; as ſimple earths, talcs, fibrariæ, gypſum, ſelenitæ, cryſtal, and ſpars: others, though uninflammable, are ſoluble in water; as all the ſimple ſalts: and others, on the contrary, are inflammable, but not ſoluble in water; as ſulphur, auripigmentum, zarnich, amber, ambergris, gagates, aſphaltum, ampelites, lithanthrax, naphtha, and piſſaſphalta. 2. The ſecond general ſubdiviſion of foſſils comprehends all ſuch as are naturally compound, but unmetallic. Of theſe, ſome are neither inflammable, nor ſoluble in water; as compound earths, ſtones, ſeptariæ, ſiderochita, ſemipellucid gems, &c. others are ſoluble in water, but not inflammable; as all the metallic ſalts: and, laſtly, ſome are inflammable, but not ſoluble in water; as the marcaſites, pyritæ, and phlogonia. 3. The third, and laſt, general diviſion of foſſils comprehends all the metallic ones; which are bodies naturally hard, remarkably heavy, and fuſible in fire. Of theſe, ſome are perfectly metallic, as being malleable when pure; ſuch are gold, lead, ſilver, copper, iron, and tin: others are imperfectly metallic, as not being malleable even in their pureſt ſtate; ſuch are antimony, biſmuth, cobalt, zinc, and quickſilver or mercury. Of all which ſubſtances, the reader will find a particular deſcription under their reſpective heads.

Extranious foſſils are bodies of the vegetable or animal kingdoms accidentally buried in the earth. Of the vegetable kingdom, there are principally three kinds, trees or parts of them, herbaceous plants, and corals; and of the animal kingdom there are four kinds, ſea-ſhells, the teeth or bony palates and bones of fiſhes, complete-fiſhes, and the bones of land-animals. See Bones, Tree, Wood, Plant, Shell, &c.

Theſe adventitious or *extraneous* foſſils, thus found buried in great abundance in divers parts of the earth, have employed the curioſity of ſeveral of our lateſt naturaliſts, who have each their ſeveral ſyſtem to account for the ſurpriſing appearances of petrefied ſea-fiſhes, in places far remote from the ſea, and on the tops of mountains; ſhells in the middle of quarries of ſtone; and of elephants teeth, and bones of divers animals, peculiar to the ſouthern climates, and plants only growing in the eaſt, found foſſil in our northern and weſtern parts.

Some will have theſe ſhells, &c. to be real ſtone, and ſtone plants, formed after the uſual manner of other figured ſtones; of which opinion is the learned Dr Liſter.

Another opinion is, that theſe foſſil ſhells, with all their foreign bodies found within the earth, as bones, trees, plants, &c. were buried therein at the time of the univerſal deluge; and that, having been penetrated either by the bituminous matter abounding chiefly in watery places, or by the ſalts of the earth, they have been preſerved entire, and ſometimes petrefied.

Others think, that thoſe ſhells, found at the tops of the higheſt mountains, could never have been carried thither by the waters, even of the deluge; inaſmuch as moſt of theſe aquatic animals, on account of the weight of their ſhells, always remain at the bottom of the water, and never move but cloſe along the ground. They imagine, that a year's continuance of the waters of the deluge, intermixed with the ſalt waters of the ſea, upon the ſurface of the earth, might well give occaſion to the production of ſhells of diverſe kinds in different climates; and that the univerſal ſaltneſs of the water was the real cauſe of their reſemblance to the ſea-ſhells, as the lakes formed daily by the retention of rain or ſpring water produce different kinds.

Others think, that the waters of the ſea, and the rivers, with thoſe which fell from heaven, turned the whole ſurface of the earth upſide down; after the ſame manner as the waters of the Loire, and other rivers, which roll in a ſandy bottom, overturn all their ſands, and even the earth itſelf, in their ſwellings and inundations; and that in this general ſubverſion, the ſhells came to be interred here, fiſhes there, trees there, &c. See DELUGE.

Dr Woodward, in his Natural Hiſtory of the Earth, purſuing and improving the hypotheſis of Dr Burnet, maintains the whole maſs of earth, with every thing belonging thereto, to have been ſo broken and diſſolved at the time of the deluge, that a new earth was then formed on the boſom of the water, conſiſting of different ſtrata, or beds of terreſtrial matter, ranged over each other uſually according to the order of their ſpecific gravities. By this means, plants, animals, and eſpecially fiſhes and ſhells, not yet diſſolved among the reſt, remained mixed and blended among the mineral and foſſil matters; which preſerved them, or at leaſt aſſumed and retained their figures and impreſſions either indentedly, or in relievo.

See more on this ſubject under the article EARTH, *paſſim*. See alſo PETRIFACTIONS and STRATA.

Foſſile Pitch. See PETROLEUM.

FOSTER (Dr James), a moſt diſtinguiſhed and popular diſſenting miniſter, born at Exeter in 1697. He began to preach in 1718; and ſtrong diſputes ariſing ſoon after, among the deſſenters, concerning the Trinity and ſubſcription to teſts, his judgment determining him to the obnoxious opinions, the clamour grew loud againſt him, and occaſioned more than one removal. His talents were hid among obſcure country congregations, until 1724; when he was choſen to ſucceed Dr Gale in Barbican, where he laboured as paſtor above 20 years. The Sunday evening-lecture, begun in the Old Jury meeting-houſe in 1728, and which he conducted with ſuch uncommon applauſe for more than 20 years, indiſputably ſhowed his abilities as a preacher. Perſons of all perſuaſions and ranks in life flocked to hear him: and Mr Pope has honoured him with a commendatory couplet in his ſatires; which, however, his commentator laboured to deſtroy the intention of by a frivolous note. In 1746, he attended the unhappy lord Kilmarnock, at his execution on Tower-hill; an office which thoſe who lived with him imagined made too deep an impreſſion on his ſympathizing ſpirit, as his vivacity abated from that time. He died in 1753; after having publiſhed ſeveral valuable compoſitions and ſermons; particularly. 1. A Defence of Chriſtianity, again Tindal's Chriſtianity as old as the Creation. 2. An Eſſay on Fundamentals. 3. Four volumes of Sermons. 4. Diſcourſes on Natural Religion and Social Virtue, in 4to.

FOSTER (Samuel), an ingenious Engliſh mathematician of the laſt century, and aſtronomical profeſſor in Greſham college, was one of that learned aſſociation which met for cultivating the new philoſophy during the political confuſions, and which Charles II. eſtabliſhed into the Royal Society. Mr Foſter, however, died in 1652, before this incorporation took place; but wrote a number of mathematical and aſtronomical treatiſes, too many to particularize. There were two other mathematical ſtudents of this name; William Foſter, a diſciple of Mr Oughtred, who taught in London; and Mark Foſter, author of a treatiſe on trigonometry, who lived later than the former two.

FOTHER, or FODDER, is a weight of lead, containing eight pigs, and every pig one and twenty ſtone and a half; ſo that it is about a ton or common cartload. Among the plumbers in London, it is nineteen hundred and a half; and at the mines it is two and twenty hundred and a half. The word is of Teutonic origin, from *fuder*.

FOTHERGILL (Dr George), was born in Weſtmoreland in 1705, where his family had been long ſeated on a competent eſtate that had deſcended regularly for ſeveral generations. After an academical education in Queen's college, Oxford, of which he became a fellow, he was, in 1751, elected principal of St Edmund's-hall, and preſented to the the vicarage of Brumley in Hampſhire. Having been long afflicted with an aſthma, he died in 1760. He was the author of a collection of much eſteemed ſermons, in 2 vols 8vo. The firſt volume conſiſts of occaſional diſcourſes, publiſhed by himſelf; the ſecond printed from his MSS.

FOTHERGILL (Dr John), a late eminent phyſician, ſon of John and Margaret, quakers, was born in 1712, at Carr End in Yorkſhire, where his father, who had been a brewer at Knareſborough (after having travelled from one end of America to the other), lived retired on a ſmall eſtate which he cultivated. The Doctor was the ſecond of five children (four ſons and a daughter), and received his education under the care of his grandfather Thomas Hough, a perſon of fortune in Cheſhire (which gave him a predilection for that county), and at Sedburg in Yorkſhire. He afterwards ſerved his time to one Mr Bartlett an apothecary at Bradford. From thence he removed to London, and became a pupil of Dr (afterwards Sir Edward) Wilmot at St Thomas's Hoſpital. He then went to the univerſity of Edingburgh to ſtudy phyſic, and took his doctor's degree there. From Edinburgh he went to Leyden: whence, after a ſhort ſtay, he returned to London, and began to practiſe about the year 1740, Fothergill.

Fothergill, Fothergilla.

in a houſe in White-hart Court, Lombard-ſtreet, where he reſided during the greateſt part of his life, and acquired moſt of his fortune. In 1746, he was admitted a licentiate of the college of phyſicians in London; and in 1754 a fellow of that of Edinburgh, to which he was a conſiderable benefactor. He afterwards became a member of the Royal Medical Society at Paris, and a member both of the Royal and Antiquarian Societies. He continued his practice with uninterrupted ſucceſs till within the laſt two years of his life, when the illneſs which he had brought on himſelf by unremitted attention, obliged him to give up a conſiderable part of it. Beſides his application to medical ſcience, he had imbibed an early taſte for natural hiſtory, improved by his friend Peter Collinſon, and employed himſelf on coquillage and ſmaller objects of botany. He was for many years a valuable contributor to the Gentleman's Magazine; where his obſervations on the weather and diſeaſes were begun in April 1751, and diſcontinued in the beginning of 1756, being diſappointed in his views of exciting other experienced phyſicians in different parts to imitate the example. He had very extenſive practice, but he did not add to his art any great or various improvements. His pamphlet on the ulcerous ſore throat is, on every account, the beſt of his publications; but owes much of its merit to the information of the late Dr Letherland. It was firſt printed in 1748, on the re-appearance of that fatal diſorder which in 1739 had carried off the two only ſons of Mr Pelham. In 1762 Dr Fothergill purchaſed an eſtate at Upton in Eſſex; and formed a botanic garden there, the ſecond in Europe: Kew is the firſt. In 1766 he began regularly to withdraw, from Midſummer to Michaelmas, from the exceſſive fatigue of his profeſſion, to Lee-Hall, near Middlewich, in Cheſhire; which, though he only rented it by the year, he had ſpared no expence to improve. He took no fees during this receſs, but attended to preſcribe gratis at an inn at Middlewich once a-week. In 1767, after he found himſelf obliged to relax his attention to buſineſs, he removed from his houſe in the city, to reſide in Harpur-ſtreet, Red-Lion Square. Some time before his death he had been induſtrious to contrive a method of generating and preſerving ice in the Weſt-Indies. He was the patron of Sidney Parkinſon, and drew up the preface prefixed to his account of the voyage to the South Seas. At his expence alſo was made and printed an entire new tranſlation of the whole Bible, from the Hebrew and Greek originals, by Anthony Purver, a quaker, in two volumes, 1764, folio, and alſo, in 1780, an edition of biſhop Piercy's "Key to the New Teſtament," adapted to the uſe of a ſeminary of young Quakers, at Acworth, near Leeds in Yorkſhire, founded in 1778 by the Society, who purchaſed, by a ſubſcription in which Dr Fothergill ſtood foremoſt, the houſe and an eſtate of thirty acres which the Foundling Hoſpital held there, but which they found inconvenient for their purpoſe on account of diſtance. The Doctor himſelf firſt projected this on the plan of a ſmaller inſtitution of the ſame kind at Gilderſomes. He alſo endowed it handſomely by his will. It now contains above 300 children of both ſexes, who are cloathed and inſtructed. Among the other beneficent ſchemes ſuggeſted by Dr Fothergill were thoſe of bringing fiſh to London by land carriage, which, though it did not in every reſpect ſucceed, tended to deſtroy a ſuppoſed combination; and of rendering bread much cheaper, though equally wholeſome, to the poor, by making it with one part of potatoes and three parts of houſehold flour. But his public benefactions, his encouragements of ſcience, the inſtances of his attention to the health, the police, the convenience of the metropolis, &c. we cannot pretend to ſpecify. The fortune which Dr Fothergill had acquired was immenſe; and, taking all things together, the houſe and moveables in Harpur-ſtreet, the property in Eſſex, and the eſtate in Cheſhire (which he held on a leaſe), and his ready money, amounted to L.80,000. His buſineſs when he was in full practice was calculated at near L. 7000 per annum. In the influenza of 1775 and 1776, he is ſaid to have had 60 patients on his liſt daily, and his profit was eſtimated at L. 8000 per annum.

The diſorder which haſtened his death was a ſcirrhus of the proſtata, and an obſtruction in the bladder (in which were found after his death two quarts of water), which had been gradually coming on him for ſix years paſt, occaſioned by a delicacy, which made him unwilling to alight from his carriage: and when, after his temporary recovery from it the year before he died, he ſubmitted to uſe relief in his carriage, it was too late. He died at his houſe in Harpur-ſtreet, December 26. 1780; and his remains were interred, January 5. in the Quakers burying-ground at Winchmore-hill, whither they were accompanied by more than 70 coaches and poſt-chaiſes, notwithſtanding the intention of the executors to have the funeral private. The Doctor by his will appointed, that his ſhells, and other pieces of natural hiſtory, ſhould be offered to the late Dr Hunter at L. 500 under the valuation he ordered to be taken of them. Accordingly Dr Hunter bought them for L. 1200. The drawings and collections in natural hiſtory were alſo to be offered to Mr (now Sir Joſeph) Banks at a valuation. His Engliſh portraits and prints, which had been collected by Mr John Nickolls of Ware, and purchaſed by him for 80 guineas, were bought for 200 guineas by Mr Thane. His books were ſold by auction, April 30. 1781, and the eight following days. His houſe and garden at Upton, in which 15 men were conſtantly employed, were valued at L. 10,000. He ſpared no expence to augment this as well as his other collections. He had an ingenious artiſt qualified to collect for him at the Cape of Good Hope, and another on the Alps, and employed for ſeveral years before his death a painter in natural hiſtory at Leeds.

Dr Fothergill's character was excellent. A tranſaction, indeed, with regard to one Dr Leeds, gave occaſion to ſome of his enemies to blame him; but how unjuſtly, has been abundantly ſhown by his biographers Dr Elliott and Dr Lettſome. Beſides the pamphlet already mentioned, Dr Fothergill wrote a conſiderable number of Tracts, which are now collected into one volume 8vo, by Dr Elliott. He ſometimes wrote in the newſpapers, and is ſaid to have been the author of more than 100 letters in the Gazeteer concerning the New Pavement.

FOTHERGILLA, in botany: A genus of the digynia order, belonging to the polyandria claſs of plants.

The calyx is lobed, moſt entire ; there is no corolla ; the germen bifid ; the capſule bilocular ; and the cells two valved ; the ſeeds ſolitary and bony.

FOTHERING, a peculiar method of endeavouring to ſtop a leak in the bottom of a ſhip while ſhe is afloat, either under ſail or at anchor. It is uſually performed in the following manner : A baſket is filled with aſhes, cinders, and chopped rope-yarns, and looſely covered with a piece of canvas ; to this is faſtened a long pole, by which it is plunged repeatedly in the water, as cloſe as poſſible to the place where the leak is conjectured to lie. The oakhum or chopped rope-yarns being thus gradually ſhaken through the twigs, or over the top of the baſket, are frequently ſucked into the holes along with the water, ſo that the leak becomes immediately choaked ; and the future entrance of the water is thereby prevented.

FOTHERINGAY, a town of Northamptonſhire, about four miles from Staneford, ſituated on the river Avon or Nen, and conſiſting of one ſtreet. Edward duke of York in the reign of Henry V. founded and endowed a fine collegiate church here, in which he was interred. At the diſſolution the college and the choir were pulled down, and the bodies of the founder and his family left expoſed till queen Elizabeth's time, who ordered them to be interred, and the preſent monuments to be erected. On the north ſide of the church is a free ſchool, founded by Henry VII. or Edward VI. endowed with L.20 *per annum* for a maſter, payable out of the exchequer by the receiver of the county. The bridge over the river here was firſt built by queen Elizabeth, 1573, of timber, with three pillars upon the foundation. Daniel, firſt earl of Nottingham, and the other truſtees for William Saville, marquis of Halifax, rebuilt it, in 1722, of freeſtone from King's Cliffe. On the ſouth-eaſt ſide of the Cliffe ſtood the caſtle ; which was of great antiquity and conſiderable ſtrength. Mary queen of Scots, who had been in the cuſtody of Sir Amias Powlet here, was tried and beheaded in the hall ; and her ſon afterwards, forgiving and even taking into favour her greateſt enemy Cecil, only took the childiſh revenge of beating down the caſtle ; which he ſo completely demoliſhed, that no more than the earthworks now remain. Within the firſt work is a farm-houſe with ſome carved ſtones wrought into it, and at the ſouth-weſt corner of the inner trench are ſome maſſes of ſtone-walls. Sir Robert Cotton carried the wainſcot of the hall to Connington.

FOU-TCHEOU, a city of China, in the province of FO-KIEN. It carries on a conſiderable trade ; but is chiefly remarkable for the magnificence of its principal bridge, which has more than 100 arches, conſtructed of white ſtone, and ornamented with a double baluſtrade throughout. This city is the reſidence of a viceroy, and has under its juriſdiction nine cities of the third claſs.

FOUGADE, or FOUGASSE, in the art of war, a little mine, about 8 or 10 feet wide, and 10 or 12 deep, dug under ſome work or poſt, which is in danger of falling into the enemy's hands ; and charged with ſacks of powder, covered with ſtones, earth, and whatever elſe can make great deſtruction. It is ſet on fire like other mines, with a fauciſſe. See MINE.

FOUL, or FOULE, in the ſea-language, is uſed when a ſhip has been long untrimmed, ſo that the graſs-weeds, or barnacles, grow to her ſides under water. A rope is alſo foul when it is either tangled in itſelf, or hindered by another, ſo that it cannot run or be over-hawled.

FOUL imports, alſo, the running of one ſhip againſt another. This happens ſometimes by the violence of the wind, and ſometimes by the careleſſneſs of the people on board, to ſhips in the ſame convoy, and to ſhips in port by means of others coming in. The damages occaſioned by running foul, are of the nature of thoſe in which both parties muſt bear a ſhare. They are uſually made half to fall upon the ſufferer, and half upon the veſſel which did the injury : but in caſes where it is evidently the fault of the maſter of the veſſel, he alone is to bear the damage.

Foul-Water. A ſhip is ſaid to make foul-water, when, being under ſail, ſhe comes into ſuch ſhoal-water, that though her keel does not touch the ground, yet it comes ſo near it, that the motion of the water under her raiſes the mud from the bottom.

FOUL is alſo a diſeaſe in cattle, proceeeding from blood, and a wateriſh rheum that falls down into the legs, and makes them ſwell.

Foul or *Pimpled Face*. See *GUTTA Roſacea*.

FOULA, or *Foul Iſland*, one of the Shetland iſles, lying between ſix and ſeven leagues weſt from the main land. It is about three miles long, narrow, and full of rough, ſteep, and bare rocks ; one of which is ſo large, and runs up to ſuch an height, that it may be clearly ſeen from Orkney. This, therefore, may be reckoned with the greateſt probability to be the Thule of Tacitus, whatever might be the Thule of the Phenicians and Greeks. It has ſcarce any paſturage, and but very little arable land ; but that, however ſmall in extent, is very fertile, out of the produce of which, with fowl and fiſh, the poor inhabitants ſubſiſt. They have nothing that can be called a port ; and the only commodities they have are ſtock-fiſh, train-oil, and feathers.

FOUMART, in zoology, a ſpecies of MUSTELA.

FOUNDATION, in architecture, is that part of a building which is under-ground. See ARCHITECTURE, n° 96 *et ſeq.* and n° 130, &c.

Palladio allows a ſixth part of the height of the whole building for the hollowing or under-digging ; unleſs there be cellars under ground, in which caſe he would have it ſomewhat lower.

FOUNDATION, denotes alſo a donation or legacy, either in money or lands, for the maintenance and ſupport of ſome community, hoſpital, ſchool, &c.

Jacob's Law Dict.

The king only can found a college, but there may be a college in reputation founded by others. If it cannot appear by inquiſition who it was that founded a church or college, it ſhall be intended that it was the king, who has power to found a new church, &c. The king may found and erect an hoſpital, and give a name to the houſe upon the inheritance of another, or licenſe another perſon to do it upon his own lands ; and the words *fundo, creo,* &c. are not neceſſary in every foundation, either of a college or hoſpital, made by the king ; but it is ſufficient if there be words equivalent : the incorporation of a college or hoſpital is the very foundation ; but he who endows it with lands is the founder ; and to the erection of an hoſpital, nothing more is requiſite but the incorporation and foundation.

Founder, Foundery.

Perſons ſeiſed of eſtates in fee-ſimple, may erect and found hoſpitals for the poor by deed enrolled in chancery, &c. which ſhall be incorporated, and ſubject to ſuch viſitors as the founder ſhall appoint, &c. ſtat. 39 Eliz. c. 5.

FOUNDER, in a general ſenſe, the perſon who lays a foundation, or endows a church, ſchool, religious houſe, or other charitable inſtitution. See FOUNDATION.

FOUNDER, alſo implies an artiſt who caſts metals, in various forms, for different uſes, as guns, bells, ſtatues printing-characters, candleſticks, buckles, &c. whence they are denominated gun-founders, bell-founders, figure-founders, letter-founders, founders of ſmall works, &c. See FOUNDERY.

FOUNDER, in the ſea language: A ſhip is ſaid to founder, when by an extraordinary leak, or by a great ſea breaking in upon her, ſhe is ſo filled with water, that ſhe cannot be freed of it; ſo that ſhe can neither veer nor ſteer, but lie like a log; and not being able to ſwim long, will at laſt ſink.

FOUNDERED, in farriery. See there, § xli.

FOUNDERY, or FOUNDRY, the art of caſting all ſorts of metals into different forms. It likewiſe ſignifies the work-houſe or ſmelting-hut wherein theſe operations are performed.

FOUNDERY of Small Works, or Caſting in Sand. The ſand uſed for caſting ſmall-works is at firſt of a pretty ſoft, yellowiſh, and clammy nature: but it being neceſſary to ſtrew charcoal-duſt in the mould, it at length becomes of a quite black colour. This ſand is worked over and over, on a board, with a roller, and a ſort of knife; being placed over a trough to receive it, after it is by theſe means ſufficiently prepared.

This done, they take a wooden board of a length and breadth proportional to the things to be caſt, and putting a ledge round it, they fill it with ſand, a little moiſtened, to make it duly cohere. Then they take either wood or metal models of what they intend to caſt, and apply them ſo to the mould, and preſs them into the ſand, as to leave their impreſſion there. Along the middle of the mould is laid half a ſmall braſs cylinder, as the chief canal for the metal to run through, when melted, into the models or patterns; and from this chief canal are placed ſeveral others which extend to each model or pattern placed in the frame. After the frame is finiſhed, they take out the patterns, by firſt looſening them all round, that the ſand may not give way.

Then they proceed to work the other half of the mould with the ſame patterns in juſt ſuch another frame only that it has pins, which entering into holes that correſpond to it in the other, make the two cavities of the pattern fall exactly on each other.

The frame, thus moulded, is carried to the melter; who after extending the chief canal of the counterpart, and adding the croſs canals to the ſeveral models in both, and ſtrewing mill duſt over them, dries them in a kind of oven for that purpoſe.

Both parts of the mould being dry, they are joined together by means of the pins; and to prevent their giving way, by reaſon of the melted metal paſſing thro' the chief cylindrical canal, they are ſcrewed or wedged up like a kind of preſs.

While the moulds are thus preparing, the metal is fuſing in a crucible of a ſize proportionate to the quantity of metal intended to be caſt.

Foundery.

When the moulds are cooliſh, the frames are unſcrewed, or unwedged, and the caſt work taken out of the ſand, which ſand is forked over again for other caſtings.

FOUNDERY of Statues. The caſting of ſtatues depends on the due preparation of the pit, the core, the wax, the outer mould, the inferior furnace to melt off the wax, and the upper to fuſe the metal. The pit is a hole dug in a dry place ſomething deeper than the intended figure, and made according to the prominence of certain parts thereof. The inſide of the pit is commonly lined with ſtone, or brick; or, when the figure is very large, they ſometimes work on the ground, and raiſe a proper fence to reſiſt the impulſion of the melted metal.

The inner mould, or core, is a rude maſs to which is given the intended attitude and contours. It is raiſed on an iron grate, ſtrong enough to ſuſtain it, and is ſtrengthened within by ſeveral bars of iron. It is generally made either of potter's clay, mixed with hair and horſe-dung; or of plaſter of Paris mixed with brick duſt. The uſe of the core is to ſupport the wax, the ſhell, and leſſen the weight of the metal. The iron bars and the core are taken out of the braſs figure through an apperture left in it for that purpoſe, which is ſoldered up afterwards. It is neceſſary to leave ſome of the iron bars of the core, that contribute to the ſteadineſs of the projecting part, within the braſs figure.

The wax is a repreſentation of the intended ſtatue. If it be a piece of ſculpture, the wax ſhould be all of the ſculptor's own hand, who uſually forms it on the core: Though it may be wrought ſeparately in cavities, moulded on a model, and afterwards arranged on the ribs of iron over the grate; filling the vacant ſpace in the middle with liquid plaſter and brickduſt, whereby the inner core is proportioned as the ſculptor carries on the wax.

When the wax, which is the intended thickneſs of the metal, is finiſhed, they fill ſmall waxen tubes perpendicular to it from top to bottom, to ſerve both as canals for the conveyance of the metal to all parts of the work; and as vent-holes, to give paſſage to the air which would otherwiſe occaſion great diſorder when the hot metal came to encompaſs it.

The work being brought thus far, muſt be covered with its ſhell, which is a kind of cruſt laid over the wax, and which being of a ſoft matter, eaſily receives the impreſſion of every part, which is afterwards communicated to the metal upon its taking the place of the wax, between the ſhell and the mould. The matter of this outer mould is varied according as different layers are applied. The firſt is generally a compoſition of clay, and old white crucibles well ground and ſifted, and mixed up with water to the conſiſtence of a colour fit for painting: accordingly they apply it with a pencil, laying it ſeven or eight times over, and letting it dry between whiles. For the ſecond impreſſion, they add horſe-dung and natural earth to the former compoſition. The third impreſſion is only horſe-dung and earth. Laſtly, the ſhell is finiſhed, by laying on ſeveral more impreſſions of this laſt matter, made very thick with the hand.

The ſhell, thus finiſhed, is ſecured by ſeveral iron girths, bound round it, at about half a foot diſtance from each other, and faſtened at the bottom to the grate under the ſtatue, and at the top to a circle of iron where they all terminate.

If the ſtatue be ſo big that it would not be eaſy to move the moulds with ſafety, they muſt be wrought on the ſpot where it is to be caſt. This is performed two ways: in the firſt, a ſquare hole is dug under ground, much bigger than the mould to be made therein, and its inſide lined with walls of free-ſtone or brick. At the bottom is made a hole of the ſame materials, with a kind of furnace, having its aperture outwards: in this is a fire made to dry the mould, and afterwards, melt the wax. Over this furnace is placed the grate, and upon this the mould, &c. formed as above. Laſtly, at one of the edges of the ſquare pit is made another large furnace to melt the metal. In the other way, it is ſufficient to work the mould above ground, but with the like precaution of a furnace and grate underneath. When finiſhed, four walls are to be run around it, and by the ſide thereof a maſſive made for a melting-furnace. For the reſt the method is the ſame in both. The mould being finiſhed, and incloſed as deſcribed, whether under ground or above it, a moderate fire is lighted in the furnace under it, and the whole covered with planks that the wax may melt gently down, and run out at pipes contrived for that purpoſe, at the foot of the mould, which are afterwards exactly cloſed with earth, ſo ſoon as the wax is carried off. This done, the hole is filled up with bricks thrown in at random, and the fire in the furnace augmented till ſuch time as both the bricks and mould become red hot. After this the fire being extinguiſhed, and every thing cold again, they take out the bricks, and fill up their place with earth moiſtened, and a little beaten to the top of the mould, in order to make it the more firm and ſteady. Theſe preparatory meaſures being duly taken, there remains nothing but to melt the metal, and run it into the mould. This is the office of the furnace above deſcribed, which is commonly made in the form of an oven with three apertures, one to put in the wood, another for a vent, and a third to run the metal out at. From this laſt aperture, which is kept very cloſe, while the metal is in fuſion, a ſmall tube is laid, whereby the melted metal is conveyed into a large earthen baſon over the mould, into the bottom of which all the big branches of the jets or caſts, which are to convey the metal into all the parts of the mould, are inſerted.

Theſe caſts or jets are all terminated with a kind of plugs, which are kept cloſe, that, upon opening the furnace, the braſs, which guſhes out with violence may not enter any of them, till the baſon be full enough of matter to run into them all at once. Upon which occaſion they pull out the plugs, which are long iron rods, with a head at one end, capable of filling the whole diameter of each tube. The whole of the furnace is opened with a long piece of iron fitted at the end of each pole, and the mould filled in an inſtant. This completes the work in relation to the caſting part; the reſt being a ſculptor's or carver's buſineſs, who taking the figure out of the mould and earth wherewith it is encompaſſed, ſaws off the jets with which it appears covered over, and repairs it with chiſſels, gravers, puncheons, &c.

FOUNDERY of Bells. The metal, it is to be obſerved, is different for bells from what its for ſtatues; there being no tin in the ſtatue-metal: but there is a fifth, and ſometimes more, in the bell-metal.

The dimenſions of the core and the wax for bells, if a ring of bells eſpecially, are not left to chance, but muſt be meaſured on a ſcale, or diapaſon, which gives the height, aperture, and thickneſs neceſſary for the ſeveral tones required.

It is on the wax that the ſeveral mouldings and other ornaments and inſcriptions, to be repreſented in relievo on the outſide of the bell, are formed. The clapper or tongue is not properly a part of the bell, but is furniſhed from other hands. In Europe, it is uſually of iron, with a large knob at the extreme; and is ſuſpended in the middle of the bell. In China, it is only a huge wooden mallet, ſtruck by force of arm againſt the bell; whence they can have but little of that conſonancy ſo much admired in ſome of our rings of bells. The Chineſe have an extraordinary way of increaſing the ſound of their bells; viz. by leaving a hole under the cannon; which our bell-founders would reckon a defect.

The proportions of our bells differ very much from thoſe of the Chineſe. In ours, the modern proportions are, to make the diameter 15 times the thickneſs of the brim, and the height 12 times. The parts of a bell are, 1. The ſounding bow, terminated by an inferior circle, which grows thinner and thinner. 2. The brim or that part of a bell whereon the clapper ſtrikes, and which is thicker than the reſt. 3. The outward ſinking of the middle of the bell, or the point under which it grows wider to the brim. 4. The waiſt or furniture, and the part that grows wider and thicker quite to the brim. 5. The upper vaſe, or that part which is above the waiſt. 6. The pallet which ſupports the ſtaple of the clapper within. 7. The bent and hollowed branches of metal uniting with the cannons, to receive the iron keys, whereby the bell is hung up to the beam, which is its ſupport and counterpoiſe, when rung out.

The buſineſs of bell-foundery is reducible to three particulars. 1. The proportion of a bell. 2. The forming of the mould. And, 3. The melting of the metal. There are two kinds of proportions, viz. the ſimple and the relative; the former are thoſe proportions only that are between the ſeveral parts of a bell to render it ſonorous; the relative proportions eſtabliſh a requiſite harmony between ſeveral bells.

The method of forming the profile to a bell, previous to its being caſt, in which the proportion of the ſeveral parts may be ſeen, is as follows: the thickneſs of the brim, C 1 (Plate CXCV.) is the foundation of every other meaſure, and is divided into three equal parts. Firſt, draw the line HD, which repreſents the diameter of the bell; biſect it in F and erect the perpendicular F f; let D F and H F be alſo biſected in E and G, and two other perpendiculars E e, or G a, be erected at E and G: G E will be the diameter of the top or upper vaſe, *i. e.* the diameter of the top will be half that of the bell; and it will therefore, be the diameter of a bell which will ſound an octave to the other. Divide the diameter of the bell or the line H D into 15 equal parts, and one of theſe will give C 1 the thickneſs of the brim; divide again each of theſe 15 equal parts into three other equal parts, and then form a ſcale. From this ſcale take 12 of the larger diviſions or $\frac{4}{15}$ of the whole ſcale in the compaſs, and ſetting one leg in D deſcribe an arc to cut the line E e in N; draw N D, and divide this line into 12 equal parts; at the point 1 erect the perpendicular 1C=10, and C1 will be the thickneſs of the brim $=\frac{1}{15}$ of the diameter: draw the line C D: biſect DN; and at the point of biſection 6 erect the perpendicular 6 K=$1\frac{1}{2}$ of the larger diviſions on the ſcale. With an opening of the compaſs equal to twice the length of the ſcale or 30 brims, ſetting one leg in N, deſcribe an arc of a circle, and with the ſame leg in K and the ſame opening deſcribe another arc to interſect the former: on this point of interſection as a centre, and with a radius equal to 30 brims, deſcribe the arc NK; in 6 K produced take K B=$\frac{1}{3}$ of the larger meaſure of the ſcale or $\frac{1}{3}$ of the brim, and on the ſame centre with the radius $30\frac{1}{3}$ brims deſcribe an arc AB parallel to NK. For the arc BC, take 12 diviſions of the ſcale or 12 brims in the compaſs; find a centre, and from that centre, with this opening, deſcribe the arc BC, in the ſame manner as NK or AB were deſcribed. There are various ways of deſcribing the arc K p; ſome deſcribe it on a centre at the diſtance of nine brims from the points p and K; others, as it is done in the figure, on a centre at the diſtance only of ſeven brims from thoſe points. But it is neceſſary firſt to find the point p, and to determine the rounding of the bell p 1. For this purpoſe, on the point C as a centre, and with the radius C 1, deſcribe the arc 1 p n; biſect the part 1, 2 of the line D n, and erecting the perpendicular p m, this perpendicular will cut the arc 1 p n in m, which terminates the rounding 1 p. Some founders make the bendings K a third of a brim lower than the middle of the line D N; others make the part C 1 D more acute, and inſtead of making C 1 perpendicular to DN at 1, draw it $\frac{1}{6}$th of a brim higher, making it ſtill equal to one brim; ſo that the line 1 D is longer than the brim C 1. In order to trace out the top-part N *a*, take in the compaſs eight diviſions of the ſcale or eight brims, on the points N and D as centres, deſcribe arcs to interſect each other in 8: on this point 8, with a radius of eight brims, deſcribe the arc N b; this arc will be the exterior curve of the top or crown: on the ſame point 8 as a centre, and with a radius equal to $7\frac{2}{3}$ brims, deſcribe the arc A e, and this will be the interior curve of the crown, and its whole thickneſs will be one third of the brim. As the point 8 does not fall in the axis of the bell, a centre M may be found in the axis by deſcribing, with the interval of eight brims on the centres D and H, arcs which will interſect in M; and this point may be made the centre of the inner and outer curves of the crown as before. The thickneſs of the cap which ſtrengthens the crown at Q is about one third of the thickneſs of the brim; and the hollow branches or ears about one-ſixth of the diameter of the bell. The height of the bell is in proportion to its diameter as 12 to 15, or in the proportion of the fundamental ſound to its third major: whence it follows, that the ſound of a bell is principally compoſed of the ſound of its extremity or brim as a fundamental of the ſound of the crown, which is an octave to it, and of that of the height which is a third.

The particulars neceſſary for making the mould of a bell are, 1. The earth: the moſt coheſive is the beſt; it muſt be well ground and ſifted, to prevent any chinks. 2. Brick-ſtone; which muſt be uſed for the mine, mould, or core, and for the furnace. 3. Horſe-dung, hair, and hemp, mixed with the earth, to render the cement more binding. 3. The wax for inſcriptions, coats of arms, &c. 5. The tallow equally mixed with the wax, in order to put a ſlight lay of it upon the outer mould, before any letters are applied to it. 6. The coals to dry the mould.

For making the mould, they have a ſcaffold conſiſting of four boards, ranged upon treſtels. Upon this they carry the earth, groſsly diluted, to mix it with horſe-dung, beating the whole with a large ſpatula.

The compaſſes of conſtruction is the chief inſtrument for making the mould, which conſiſt of two different legs joined by a third piece. And laſt of all, the founders ſhelves, on which are the engravings of the letters, cartridges, coats of arms, &c.

They firſt dig a hole of a ſufficient depth to contain the mould of the bell, together with the caſe or cannon, under ground; and about ſix inches lower than the terreplain, where the work is performed. The hole muſt be wide enough for a free paſſage between the mould and walls of the hole, or between one mould and another, when ſeveral bells are to be caſt. At the centre of the hole is a ſtake erected, that is ſtrongly faſtened in the ground. This ſupports an iron peg, on which the pivot of the ſecond branch of the compaſſes turns. The ſtake is incompaſſed with a ſolid brick-work, perfectly round, about half a foot high, and of the propoſed bell's diameter. This they call a *mill-ſtone*. The parts of the mould are, the core, the model of the bell, and the ſhell. When the outer ſurface of the core is formed, they begin to raiſe the core, which is made of bricks that are laid in courſes of equal height upon a lay of plain earth. At the laying of each brick, they bring near it the branch of the compaſſes, on which the curve of the core is ſhaped, ſo as that there may remain between it and the curve the diſtance of a line, to be afterwards filled up with layers of cement. The work is continued to the top, only leaving an opening for the coals to bake the core. This work is covered with a layer of cement, made of earth and horſe-dung; on which they move the compaſſes of conſtruction, to make it of an even ſmoothneſs every where.

The firſt layer being finiſhed, they put the fire to the core, by filling it half with coals, through an opening that is kept ſhut, during the baking, with a cake of earth that has been ſeparately baked. The firſt conſumes the ſtake, and the fire is left in the core half or ſometimes a whole day: the firſt layer being thoroughly dry, they cover it with a ſecond, third, and fourth; each being ſmoothed by the board of the compaſſes, and thoroughly dried before they proceed to another.

The core being completed, they take the compaſſes to pieces, with intent to cut off the thickneſs of the model, and the compaſſes are immediately put in their place to begin a ſecond piece of the mould. It conſiſts of a mixture of earth and hair, applied with the hand on the core, in ſeveral cakes that cloſe together. This work is finiſhed by ſeveral layers of a thinner cement of the ſame matter, ſmooothed by the compaſſes, and thoroughly dried before another is laid on. The firſt layer of the model is a mixture of wax and greaſe ſpread over the whole. After which are applied the inſcriptions, coats of arms, &c. beſmeared with a pencil dipped in a veſſel of wax in a chafing-diſh: this is done for every letter. Before the ſhell is begun, the compaſſes are taken to pieces, to cut off all the wood that fills the place of the thickneſs to be given to the ſhell.

The firſt layer is the ſame earth with the reſt, ſifted very fine; whilſt it is tempering in water, it is mixed with cow's hair to make it cohere. The whole being a thin cullis, is gently poured on the model, that fills exactly all the ſinuoſities of the figures, &c. and this is repeated till the whole is two lines thick over the model. When this layer is thoroughly dried, they cover it with a ſecond of the ſame matter, but ſomewhat thicker; when this ſecond layer becomes of ſome conſiſtence, they apply the compaſſes again, and light a fire in the core, ſo as to melt off the wax of the inſcriptions, &c.

After this, they go on with other layers of the ſhell, by means of the compaſſes. Here they add to the cow's hair a quantity of hemp, ſpread upon the layers, and afterwards ſmoothed by the board of the compaſſes. The thickneſs of the ſhell comes to four or five inches lower than the mill-ſtone before obſerved, and ſurrounds it quite cloſe, which prevents the extravaſation of the metal. The wax ſhould be taken out before the melting of the metal.

The ear of the bell requires a ſeparate work, which is done during the drying of the ſeveral incruſtations of the cement. It has ſeven rings: the ſeventh is called the *bridge*, and unites the others, being a perpendicular ſupport to ſtrengthen the curves. It has an aperture at the top, to admit a large iron peg, bent at the bottom; and this is introduced into two holes in the beam, faſtened with two ſtrong iron keys. There are models made of the rings, with maſſes of beaten earth, that are dried in the fire, in order to have the hollow of them. Thoſe rings are gently preſſed upon a layer of earth and cow's hair, one half of its depth; and then taken out, without breaking the mould. This operation is repeated 12 times for 12 half-moulds, that two and two united may make the hollows of the ſix rings; the ſame they do for the hollow of the bridge, and bake them all, to unite them together.

Upon the open place left for the coals to be put in, are placed the rings that conſtitute the ear. They firſt put into this open place the iron-ring to ſupport the clapper of the bell; then they make a round cake of clay, to fill up the diameter of the thickneſs of the core. This cake, after baking, is clapped upon the opening, and ſoldered with a thin mortar ſpread over it, which binds the cover cloſe to the core.

The hollow of the model is filled with an earth, ſufficiently moiſt to fix on the place, which is ſtrewed at ſeveral times upon the cover of the core; and they beat it gently with a peſtle, to a proper height; and a workman ſmooths the earth at top with a wooden trowel dipped in water.

Upon this cover, to be taken off afterwards, they aſſemble the hollows of the rings. When every thing is in its proper place, they ſtrengthen the outſide of the hollows with mortar, in order to bind them with the bridge, and keep them ſteady at the bottom, by means of a cake of the ſame mortar, which fills up the whole aperture of the ſhell. This they let dry, that it may be removed without breaking. To make room for the metal, they pull off the hollows of the rings, through which the metal is to paſs, before it enters into the vacuity of the mould. The ſhell being unloaded of its ear, they range under the millſtone five or ſix pieces of wood, about two feet long, and thick enough to reach almoſt the lower part of the ſhell; between theſe and the mould, they drive in wooden wedges with a mallet, to ſhake the ſhell of the model whereon it reſts, ſo as to be pulled up and got out of the pit.

When this and the wax are removed, they break the model and the layer of earth, through which the metal muſt run, from the hollow of the rings, between the ſhell and the core. They ſmoke the inſide of the ſhell, by burning ſtraw under it, that helps to ſmooth the ſurface of the bell. Then they put the ſhell in the place, ſo as to leave the ſame interval between that and the core; and before the hollows of the rings or the cap are put on again, they add two vents, that are united to the rings, and to each other, by a maſs of baked cement. After which they put on this maſs of the cap, the rings, and the vent, over the ſhell, and ſolder it with thin cement, which is dried gradually by covering it with burning coals. Then they fill up the pit with earth, beating it ſtrongly all the time round the mould.

The furnace has a place for the fire, and another for the metal. The fire-place has a large chimney with a ſpacious aſh-hole. The furnace which contains the metal is vaulted, whoſe bottom is made of earth, rammed down; the reſt is built with brick. It has four apertures; the firſt, through which the flame reverberates; the ſecond is cloſed with a ſtopple that is opened for the metal to run; the others are to ſeparate the droſs or ſcoriæ of the metal by wooden rakes: through theſe laſt apertures paſſes the thick ſmoke. The ground of the furnace is built ſloping, for the metal to run down.

FOUNDERY of Great Guns and Mortar-Pieces. The method of caſting theſe pieces is little different from that of bells: they are run maſſy, without any core, being determined by the hollow of the ſhell: and they are afterwards bored with a ſteel trepan, that is worked either by horſes or a water-mill.

For the metal, parts, proportions, &c. of theſe pieces, ſee GUNNERY.

Letter-FOUNERY, or *Caſting of Printing Letters.*

In the buſineſs of cutting, caſting, &c. letters for printing, the letter-cutter muſt be provided with a vice, hand-vice, hammers, and files of all ſorts for watchmakers uſe; as alſo gravers and ſculpters of all ſorts, and an oil-ſtone, &c. ſuitable and ſizeable to the ſeveral letters to be cut: a flat gage made of box to hold a rod of ſteel, or the body of a mould, &c. exactly perpendicular to the flat of the uſing file: a ſliding-gage whoſe uſe is to meaſure and ſet off diſtances between the ſhoulder and the tooth, and to mark it off from the end, or from the edge of the work: a face-gage, which is a ſquare notch cut with a file into the edge of a thin plate of ſteel, iron, or braſs, of the thickneſs of a piece of common tin, whoſe uſe is to proportion the face of each ſort of letter, *viz.* long letters, aſcending letters, and ſhort letters. So there muſt be three gages, and the gage for the long letters is the length of the whole body ſuppoſed to be divided into 42 equal parts. The gage for the aſcending letters Roman and Italic are $\frac{5}{7}$, or 30 parts of 42, and 33 parts for the Engliſh face. The gage for the ſhort letters is $\frac{3}{7}$, or 18 parts of 42 of the whole body for the Roman and Italic, and 22 parts for the Engliſh face.

The Italic and other ſtanding gages are to meaſure the ſcope of the Italic ſtems, by applying the top and bottom of the gage to the top and bottom lines of the letters, and the other ſide of the gage to the ſtem; for when the letter complies with theſe three ſides of the gage, that letter has its true ſhape.

The next care of the letter-cutter is to prepare good ſteel punches, well tempered, and quite free from all veins of iron; on the face of which he draws or marks the exact ſhape of the letter with pen and ink if the letter be large, or with a ſmooth blunted point of a needle if it be ſmall; and then with ſizeable and proper ſhaped and pointed gravers and ſculpters, digs or ſculps out the ſteel between the ſtrokes or marks he made on the face of the punch, and leaves the marks ſtanding on the face. Having well ſhaped the inſide ſtrokes of his letter, he deepens the hollows with the ſame tools; for if a letter be not deep in proportion to its width, it will, when uſed at preſs, print black, and be good for nothing. This work is generally regulated by the depth of the counter-punch. Then he works the outſide with proper files till it be fit for the matrice.

But before we proceed to the ſinking and juſtifying of the matrices, we muſt provide a mould to juſtify them by, of which you have a draught in Plate CXCV. fig. 1. 2.

Every mould is compoſed of an upper and an under part. The under part is delineated in fig. 1. The upper part is marked fig. 2. and is in all reſpects made like the under part, excepting the ſtool behind, and the bow or ſpring alſo behind; and excepting a ſmall roundiſh wire between the body and carriage, near the break, where the under part hath a ſmall rounding groove made in the body. This wire, or rather half-wire, in the upper part makes the nick in the ſhank of the letter, when part of it is received into the groove in the under part. Theſe two parts are ſo exactly fitted and gaged into one another (*viz.* the male-gage marked *c* in fig. 2. into the female marked *g* in fig. 1. that when the upper part of the mould is properly placed on, and in the under part of the mould, both together make the entire mould, and may be ſlid backwards for uſe ſo far, till the edge of either of the bodies on the middle of either carriage comes juſt to the edge of the female gages cut in each carriage: and they may be ſlid forward ſo far, till the bodies on either carriage touch each other: and the ſliding of theſe two parts of the mould backwards makes the ſhank of the letter thicker, becauſe the bodies in each part ſtand wider aſunder; and the ſliding them forwards makes the ſhank of the letter thinner, becauſe the bodies on each part of the mould ſtand cloſer together. The parts of the mould are as follow: *viz.* a, The carriage. b, The body. c, The male gage. d e, The mouth-piece. f i, The regiſter. g, The female gage. h, The hag. *a a a a*, The bottom plate. *b b b*, The wood on which the bottom plate lies. *c c c*, The mouth. *d d*, The throat. *e d d*, The pallat. *f*, The nick. *g g*, The ſtool. *h h*, The ſpring or bow.

Then the mould muſt be juſtified: and firſt the founder juſtifies the body, by caſting about 20 proofs or ſamples of letters; which are ſet up in a compoſing ſtick, with all their nicks towards the right hand; and then by comparing theſe with the pattern letters, ſet up in the ſame manner, he finds the exact meaſure of the body to be caſt. He alſo tries if the two ſides of the body are parallel, or that the body be no bigger at the head than at the foot, by taking half the number of his proofs and turning them with their heads to the feet of the other half; and if then the heads and the feet be found exactly even upon each other, and neither to drive out or get in, the two ſides may be pronounced parallel. He farther tries whether the two ſides of the thickneſs of the letter be parallel, by firſt ſetting his proofs in the compoſing ſtick with their nicks upwards, and then turning one half with their head to the feet of the other half; and if the heads and feet lie exactly upon each other, and neither drive out nor get in, the two ſides of the thickneſs are parallel.

The mould thus juſtified, the next buſineſs is to prepare the matrices. A matrice is a piece of braſs or copper of about an inch and a half long, and of a thickneſs in proportion to the ſize of the letter it is to contain. In this metal is ſunk the face of the letter intended to be caſt, by ſtriking the letter punch about the depth of an n. After this, the ſides and face of the matrice muſt be juſtified and cleared with files of all bunchings made by ſinking the punch.

Every thing thus prepared, it is brought to the furnace; which is built of brick upright, with four ſquare ſides, and a ſtone on the top, in which ſtone is a wide round hole for the pan to ſtand in. A foundery of any conſequence has ſeveral of theſe furnaces in it.

As to the metal of which the types are to be caſt, this, in extenſive founderies, is always prepared in large quantities; but caſt into ſmall bars, of about 20 pounds weight, to be delivered out to the workmen as occaſion requires. In the letter foundery which has been long carried on with reputation under the direction of Dr Alex. Wilſon and ſons at Glaſgow, we are informed, that a ſtock of metal is made up at two different times of the year, ſufficient to ſerve the caſters at the furnace for ſix months each time. For this purpoſe, a large furnace is built under a ſhade, furniſhed with a wheel vent, in order the more equally to heat the ſides of a ſtrong pot of caſt-iron, which holds when full fifteen hundred weight of the metal. The fire being kindled below, the bars of lead are let ſoftly down into the pot, and their fuſion promoted by throwing in ſome pitch and tallow, which ſoon inflame. An outer chimney, which is built ſo as to project about a foot over the fartheſt lip of the pot, catches hold of the flame by a ſtrong draught, and makes it act very powerfully in melting lead; whilſt it ſerves at the ſame time to convey away all the fumes, &c. from the workmen, to whom this laborious part of the buſineſs is committed. When the lead is thoroughly melted, a due proportion of the regulus of antimony and other ingredients are put in, and ſome more tallow is inflamed to make the whole incorporate ſooner. The workmen now having mixed the contents of the pot very thoroughly by ſtirring long with a large iron ladle, next proceed to draw the metal off into the ſmall troughs of caſt-iron, which are ranged to the number of fourſcore upon a level platform faced with ſtone, built towards the right hand. In the courſe of a day 15 hundred weight of metal can be eaſily prepared in this manner; and the operation is continued for as many days as are neceſſary to prepare a ſtock of metal of all the various degrees of hardneſs. After this, the whole is diſpoſed into preſſes according to its quality, to be delivered out occaſionally to the workmen.

The founder muſt now be provided with a ladle, which differs nothing from other iron ladles but in its ſize; and he is provided always with ladles of ſeveral ſizes, which he uſes according to the ſize of the letters he is to caſt. Before the caſter begins to caſt, he muſt kindle his fire in the furnace to melt the metal in the pan. Therefore he takes the pan out of the hole in the ſtone, and there lays in coals and kindles them; and, when they are well kindled, he ſets the pan in again, and puts in metal into it to melt: if it be a ſmall-bodied letter he caſts, or a thin letter of great bodies, his metal muſt be very hot; nay ſometimes red-hot, to make the letter come. Then having choſen a ladle that will hold about ſo much as the letter and break is, he lays it at the ſtoking-hole, where the flame burſts out, to heat. Then he ties a thin leather, cut with its narrow end againſt the face to the leather groove of the matrice, by whipping a brown thread twice about the leather-groove, and faſtening the thread with a knot. Then he puts both halves of the mould together, and puts the matrice into the matrice-cheek, and places the foot of the matrice on the ſtool of the mould, and the broad end of the leather upon the wood of the upper half of the mould, but not tight up, leſt it might hinder the foot of the matrice from ſinking cloſe down upon the ſtool in a train of work. Then laying a little roſin on the upper wood of the mould, and having his caſting-ladle hot, he with the boiling ſide of it melts the roſin; and, when it is yet melted, preſſes the broad end of the leather hard down on the wood, and ſo faſtens it to the wood; all this is the preparation.

Now he comes to caſting. Wherefore, placing the under half of the mould in his left hand, with the hook or hag forward, he clutches the ends of its wood between the lower part of the ball of his thumb and his three hind fingers; then he lays the upper half of the mould upon the under half, ſo that the male gages may fall into the female gages, and at the ſame time the foot of the matrice places itſelf upon the ſtool; and, claſping his left-hand thumb ſtrong over the upper half of the mould, he nimbly catches hold of the bow or ſpring with his right-hand fingers at the top of it, and his thumb under it, and places the point of it againſt the middle of the notch in the backſide of the matrice, preſſing it as well forwards towards the mould, as downwards by the ſhoulder of the notch cloſe upon the ſtool, while at the ſame time with his hinder fingers, as aforeſaid, he draws the under half of the mould towards the ball of his thumb, and thruſts by the ball of his thumb the upper part towards his fingers, that both the regiſters of the mould may preſs againſt both ſides of the matrice, and his thumb and fingers preſs both halves of the mould cloſe together.

Then he takes the handle of his ladle in his right hand, and with the boll of it gives a ſtroke, two or three, outwards upon the ſurface of the melted metal, to ſcum or clear it from the film or duſt that may ſwim upon it; then takes up the ladle full of metal, and having his mould, as aforeſaid, in his left hand, he a little twiſts the left ſide of his body from the furnace, and brings the geat of his ladle (full of metal) to the mouth of the mould, and twiſts the upper part of his right hand towards him to turn the metal into it, while at the ſame moment of time he jilts the mould in his left hand forwards, to receive the metal with a ſtrong ſhake (as it is called), not only into the body of the mould, but while the metal is yet hot running, ſwift and ſtrongly, into the very face of the matrice, to receive its perfect form there, as well as in the ſhank.

Then he takes the upper half of the mould off the under half, by placing his right-hand thumb on the end of the wood next his left-hand thumb, and his two middle-fingers at the other end of the wood; and finding the letter and break lie in the under half of the mould (as moſt commonly by reaſon of its weight it does), he throws or toſſes the letter, break and all, upon a ſheet of waſte paper laid for that purpoſe on the bench, juſt a little beyond his left hand, and is then ready to caſt another letter as before; and alſo, the whole number that is to be caſt with that matrice. A workman will ordinarily caſt about three thouſand of theſe letters in a day.

When the caſters at the furnace have got a ſufficient number of types upon the tables, a ſet of boys come and nimbly break away the jets from them: the jets are thrown into the pots, and the types are carried away in parcels to other boys, who paſs them ſwiftly under their fingers, defended by leather, upon ſmooth flat ſtones, in order to poliſh their broad-ſides. This is a very dexterous operation, and is a remarkable inſtance of what may be effected by the power of habit and long practice; for theſe boys, in turning up the other ſide of the type, do it ſo quickly by a mere touch of the fingers of the left hand, as not to require the leaſt perceptible intermiſſion in the motion of the right hand upon the ſtone. The types, thus finely ſmoothed and flattened on the broad-ſides, are next carried to another ſet of boys, who ſit at a ſquare table, two on each ſide, and there are ranged up on long rulers or ſticks, fitted with a ſmall projection, to hinder them from ſliding off backwards. When theſe ſticks are ſo filled, they are placed, two and two, upon a ſet of wooden pins fixed into the wall, near the dreſſer, ſometimes to the amount of an hundred, in order to undergo the finiſhing operations. This workman, who is always the moſt expert and ſkilful in all the different branches carried on at the foundery, begins by taking one of theſe ſticks, and, with a peculiar addreſs, ſlides the whole column of types off upon the dreſſing-ſtick: this is made of well-ſeaſoned mahogany, and furniſhed with two end-pieces of ſteel, a little lower than the body of the types, one of which is moveable, ſo as to approach the other by means of a long ſcrew-pin, inſerted in the end of the ſtick. The types are put into this ſtick with their faces next to the back or projection; and after they are adjuſted to one another ſo as to ſtand even, they are then bound up, by ſcrewing home the moveable end-piece. It is here where the great

Foundery.

great and requiſite accuracy of the moulds come to be perceived; for in this caſe the whole column, ſo bound up, lies flat and true upon the ſtick, the two extreme types being quite parallel, and the whole has the appearance of one ſolid continuous plate of metal. The leaſt inaccuracy in the exact parallelism of the individual type when multiplied ſo many times, would render it it impoſſible to bind them up in this manner, by diſpoſing them to riſe or ſpring from the ſtick by the ſmalleſt preſſure from the ſcrew. Now, when lying ſo conveniently with the narrow edges uppermoſt, which cannot poſſibly be ſmoothed in the manner before mentioned by the ſtones, the workman does this more effectually by ſcraping the ſurface of the column with a thick-edged but ſharp razor, which at every ſtroke brings on a very fine ſmooth ſkin, like to poliſhed ſilver; and thus he proceeds till in about half a minute he comes to the farther end of the ſtick. The other edges of the types are next turned upwards, and poliſhed in the ſame manner. It is whilſt the types thus lie in the dreſſing-ſtick that the operation of bearding or barbing is performed, which is effected by running a plane, faced with ſteel, along the ſhoulder of the body next to the face, which takes more or leſs off the corner, as occaſion may require. Whilſt in the dreſſing-ſtick they are alſo grooved, which is a very material operation. In order to underſtand this, it muſt be remembered, that when the types are firſt broken off from the jets, ſome ſuperfluous metal always remains, which would make them bear very unequally againſt the paper whilſt under the printing-preſs, and effectually mar the impreſſion. That all theſe inequalities may, therefore, be taken away, and that the bearings of every type may be regulated by the ſhoulders imparted to them all alike from the mould, the workman or dreſſer proceeds in the following manner. The types being ſcrewed up in the ſtick, as before mentioned, with the jet-end outermoſt, and projecting beyond the wood about one-eighth of an inch, the ſtick is put into an open preſs, ſo as to preſent the jet-end uppermoſt, and then every thing is made faſt by driving a long wedge, which bears upon a ſlip of wood, which lies cloſe to the types the whole length: then a plough or plane is applied, which is ſo conſtructed as to embrace the projecting part of the types betwixt its long ſides, which are made of poliſhed iron. When the plane is thus applied, the ſteel cutter bearing upon that part between the ſhoulders of the types, where the inequalities lie, the dreſſer dexterouſly glides it along, and by this means ſtrips off every irregular part that comes in the way, and ſo makes an uniform groove the whole length, and leaves the two ſhoulders ſtanding; by which means every type become preciſely like to another, as to the height againſt paper. The types being now finiſhed, the ſtick is taken out of the preſs, and the whole column replaced upon the other ſtick: and after the whole are ſo dreſſed, he proceeds to pick out the bad letters, previous to putting them up into pages and papers. In doing this he takes the ſtick into his left hand, and turning the faces near to the light, he examines them carefully, and whenever an imperfect or damaged letter occurs, he nimbly plucks it out with a ſharp bodkin, which he holds in the right hand for that purpoſe. Thoſe letters which, from their form, project over the body of the type, and which cannot on this account be rubbed on the ſtones, are ſcraped on the broad-ſides with a knife or file, and ſome of the metal next the face pared away with a penknife, in order to allow the type to come cloſe to any other. This operation is called *kerning*.

Fount, Fountain.

The excellence of printing types conſiſts not only in the due performance of all the operations above deſcribed, but alſo in the hardneſs of the metal, form, and fine proportion of the character, and in the exact bearing and ranging of the letters in relation to one another.

FOUNT, or **Font**, among printers, &c. a ſet or quantity of characters or letters of each kind, caſt by a letter-founder, and ſorted.—We ſay, a founder has caſt a fount of pica, of engliſh, of pearl, &c. meaning that he has caſt a ſet of characters of theſe kinds.

A complete fount does not only include the running letters, but alſo large and ſmall capitals, ſingle letters, double letters, points, commas, lines, and numeral characters.

Founts are large or ſmall, according to the demand of the printer who orders them by the hundred weight, or by ſheets. When the printer orders a fount of 500, he means that the fount ſhould weigh 500 lb. When he demands a fount of 10 ſheets, it is underſtood, that with that fount he ſhall be able to compoſe 10 ſheets, or 20 forms, without being obliged to diſtribute. The founder takes his meaſures accordingly; he reckons 120 pounds for a ſheet, including the quadrates, &c. or 60 pounds for a form, which is half a ſheet: not that the ſheet always weighs 120 pounds, or the form 60 pounds; on the contrary, it varies according to the ſize of the form; beſides, it is always ſuppoſed that there are letters left in the caſes.

The letter-founders have a kind of liſt, or tariff, whereby they regulate their founts: the occaſion thereof is, that ſome letters being in much more uſe, and oftener repeated than others, their cells or caſes, ſhould be better filled and ſtored than thoſe of the letters which do not return ſo frequently. Thus the *o* and *i*, for inſtance, are always greater in quantity than the *k* or *z*.

This difference will be beſt perceived from a proportional compariſon of thoſe letters with themſelves, or ſome others. Suppoſe a fount of 100,000 characters, which is a common fount; here the *a* ſhould have 5000, the *c* 3000, the *e* 11,000, the *i* 6000, the *m* 3000, the *k* only 300, and the *x*, *y*, and *z*, not many more. But this is only to be underſtood of the letters of the lower caſe; thoſe of the upper having other proportions, which it would be here too long to inſiſt on.

FOUNTAIN, a ſpring or ſource of water riſing out of the earth. Among the ancients, fountains were generally eſteemed as ſacred: but ſome were held to be ſo in a more particular manner. The good effects received from cold baths gave ſprings and rivers this high reputation; for the ſalutary influence was ſuppoſed to proceed from ſome preſiding deity. Particular reaſons might occaſion ſome to be held in greater veneration than others. It was cuſtomary to throw little pieces of money into thoſe ſprings, lakes, or rivers, which were eſteemed ſacred, to render the preſiding divinities propitious; as the touch of a naked body was ſuppoſed to pollute their hallowed waters. For the phenomena, theory, and origin, of fountains or ſprings. See SPRING.

Artificial FOUNTAIN, called alſo a *jet d'eau*, is a contrivance by which water is violently ſpouted upwards. See HYDRAULICS.

Boiling FOUNTAIN. See ICELAND.

FOUNTAIN-*Tree*, a very extraordinary vegetable growing in one of the Canary iſlands, and likewiſe ſaid to exiſt in ſome other places, which diſtils water from its leaves in ſuch plenty as to anſwer all the purpoſes of the inhabitants who live near it. Of this tree we have the following account in Glaſſe's hiſtory of the Canary iſlands.—" There are only three fountains of water in the whole iſland of Hierro, wherein the fountain-tree grows. One of theſe fountains is called *Acof*, which, in the language of the ancient inhabitants, ſignifies *river*; a name, however, which does not ſeem to have been given it on account of its yielding much water, for in that reſpect it hardly deſerves the name of a fountain. More to the northward is another called *Hapio*; and in the middle of the iſland is a ſpring, yielding a ſtream about the thickneſs of a man's finger. This laſt was diſcovered in the year 1565, and is called the *fountain of Anton. Hernandez*. On account of the ſcarcity of water, the ſheep, goats, and ſwine, here do not drink in the ſummer, but are taught to dig up the roots of fern, and chew them to quench their thirſt. The great cattle are watered at thoſe fountains, and at a place where water diſtils from the leaves of a tree. Many writers have made mention of this famous tree, ſome in ſuch a manner as to make it appear miraculous: others again deny the exiſtence of any ſuch tree; among whom is Father Feyjoo, a modern Spaniſh author, in his Theatro Critico. But he, and thoſe who agree with him in this matter, are as much miſtaken as thoſe who would make it appear to be miraculous. This is the only iſland of all the Canaries which I have not been in; but I have ſailed with natives of Hierro, who, when queſtioned about the exiſtence of this tree, anſwered in the affirmative.

" The author of the *Hiſtory of the diſcovery and conqueſt* has given us a particular account of it, which I ſhall here relate at large.

' The diſtrict in which this tree ſtands is called *Tigulahe*; near to which, and in the cliff or ſteep rocky aſcent that ſurrounds the whole iſland, is a narrow gutter or gulley, which commences at the ſea, and continues to the ſummit of the cliff, where it joins or coincides with a valley which is terminated by the ſteep front of a rock. On the top of this rock grows a tree, called in the language of the ancient inhabitants, *Garſe*, " Sacred or Holy Tree," which for many years has been preſerved ſound, entire, and freſh. Its leaves conſtantly diſtil ſuch a quantity of water as is ſufficient to furniſh drink to every living creature in Hierro; nature having provided this remedy for the drought of the iſland. It is ſituated about a league and a half from the ſea. Nobody knows of what ſpecies it is, only that it is called *Til*. It is diſtinct from other trees, and ſtands by itſelf: the circumference of the trunk is about 12 ſpans, the diameter four, and in height from the ground to the top of the higheſt branch, 40 ſpans: the circumference of all the branches together is 120 feet. The branches are thick and extended; the loweſt commence about the height of an ell from the ground. Its fruit reſembles the acorn, and taſtes ſomething like the kernel of a pine apple, but is ſofter and more aromatic. The leaves of this tree reſemble thoſe of the laurel, but are larger, wider, and more curved; they come forth in a perpetual ſucceſſion, ſo that the tree always remains green. Near to it grows a thorn which faſtens on many of its branches, and interweaves with them; and at a ſmall diſtance from the garſe are ſome beech-trees, breſos, and thorns. On the north ſide of the trunk are two large tanks or ciſterns, of rough ſtone, or rather one ciſtern divided, each half being 20 feet ſquare and 16 ſpans in depth. One of theſe contains water for the drinking of the inhabitants; and the other that which they uſe for their cattle, waſhing, and ſuch like purpoſes. Every morning, near this part of the iſland, a cloud or miſt ariſes from the ſea, which the ſouth and eaſterly winds force againſt the fore-mentioned ſteep cliff; ſo that the cloud having no vent but by the gutter, gradually aſcends it, and from thence advances ſlowly to the extremity of the valley, whence it is ſtopped and checked by the front of the rock which terminates the valley, and then reſts upon the thick leaves and wide-ſpreading branches of the tree, from whence it diſtils in drops during the remainder of the day, until it is at length exhauſted, in the ſame manner that we ſee water drip from the leaves of trees after a heavy ſhower of rain. This diſtillation is not peculiar to the garſe or til; for the breſos, which grow near it likewiſe drop water; but their leaves being few and narrow, the quantity is ſo trifling, that though the natives ſave ſome of it, yet they make little or no account of any but what diſtils from the til, which, together with the water of ſome fountains, and what is ſaved in the winter ſeaſon, is ſufficient to ſerve them and their flocks. This tree yields moſt water in thoſe years when the Levant or eaſterly winds have prevailed for a continuance; for, by theſe winds only the clouds or miſts are drawn hither from the ſea. A perſon lives on the ſpot near which this tree grows, who is appointed by the council to take care of it and its water; and is allowed a houſe to live in, with a certain ſalary. He every day diſtributes to each family of the diſtrict ſeven pots or veſſels full of water, beſides what he gives to the principal people of the iſland.'

" Whether the tree which yields water at this preſent time be the ſame as that mentioned in the above deſcription, I cannot pretend to determine; but it is probable there has been a ſucceſſion of them; for Pliny, deſcribing the Fortunate Iſland, ſays, ' In the mountains of Ombrion are trees reſembling the plant ferula, from which water may be procured by preſſure. What comes from the black kind is bitter, but that which the white yields is ſweet and potable."

Trees yielding water are not peculiar to the iſland of Hierro; for travellers inform us of one of the ſame kind on the iſland of St Thomas, in the bight or gulph of Guiney. In Cockburn's voyages we find the following account of a dropping tree, near the mountains of Fera Paz, in America.

" On the morning of the fourth day we came out on a large plain, where were great numbers of fine deer, and in the middle ſtood a tree of unuſual ſize, ſpreading its branches over a vaſt compaſs of ground.

curioſity led us up to it. We had perceived, at ſome diſtance off, the ground about it to be wet; at which we began to be ſomewhat ſurpriſed, as well knowing there had no rain fallen for near ſix months paſt, according to the certain courſe of the ſeaſon in that latitude: that it was impoſſible to be occaſioned by the fall of dew on the tree, we were convinced, by the ſun's having power to exhale away all moiſture of that nature a few minutes after its riſing. At laſt, to our great amazement as well as joy, we ſaw water dropping, or as it were diſtilling, faſt from the end of every leaf of this wonderful (nor had it been amiſs as I had ſaid *miraculous*) tree; at leaſt it was ſo with reſpect to us, who had been labouring four days through extreme heat, without receiving the leaſt moiſture, and were now almoſt expiring for the want of it.

"We could not help looking on this as liquor ſent from heaven to comfort us under great extremity. We catched what we could of it in our hands, and drank very plentifully of it; and liked it ſo well, that we could hardly prevail with ourſelves to give over. A matter of this nature could not but incite us to make the ſtricteſt obſervations concerning it; and accordingly we ſtaid under the tree near three hours, and found we could not fathom its body in five times. We opſerved the ſoil where it grew to be very ſtrong; and upon the niceſt enquiry we could afterwards make, both of the natives of the country and the Spaniſh inhabitants, we could not learn there was any ſuch tree known throughout New Spain, nor perhaps all America over: but I do not relate this as a prodigy in nature, becauſe I am not philoſopher enough to aſcribe any natural cauſe for it; the learned may perhaps give ſubſtantial reaſons in nature for what appeared to us a great and marvellous ſecret."

FOUQUIERES (James), an eminent painter, was born at Antwerp in 1580, and received his chief inſtructions from Velvet Brughel. He applied himſelf to the ſtudy of the landſcapes, and went to Italy to improve himſelf in colouring; and ſucceeded ſo happily, that his works are ſaid to be nearly equal to thoſe of Titian.—He was engaged and much careſſed at the court of the elector Palatine, and afterwards ſpent ſeveral years of his life in France; where his works met with univerſal approbation, and he was proportionably well paid for his paintings. Yet by ſome miſconduct he ſunk into poverty, and died in the houſe of an inconſiderable painter in 1659. He had reſided for ſeveral years at Rome and Venice, where he acquired that excellent ſtyle of colouring and deſign for which he is ſo deſervedly diſtinguiſhed.

FOURCHEE, or FOURCHY, in heraldry, an appellation given to a croſs forked at the ends. See HERALDRY.

FOURMONT (Stephen), profeſſor of the Arabic and Chineſe languages, and one of the moſt learned men of his time, was born at Herbelia, a village four leagues from Paris, in 1683. He ſtudied in Mazarine college, and afterwards in the Seminary of Thirty-three. He was at length profeſſor of Arabic in the Royal College, and was made a member of the Academy of Inſcriptions. In 1738 he was choſen a member of the Royal Society in London, and of that of Berlin in 1741. He was often conſulted by the duke of Orleans, firſt prince of the blood; who had a particular eſteem for him, and made him one of his ſecretaries. He wrote a great number of books; the moſt conſiderable of thoſe which have been printed are, 1. The Roots of the Latin Tongue, in verſe. 2. Critical Reflections on the Hiſtories of ancient Nations. 2 vols 4to. 3. *Meditationes Sinicæ*, folio. 4. A Chineſe Grammar, in Latin, folio. 5. Several Diſſertions printed in the Memoirs of the Academy of Inſcriptions, &c. He died at Paris in 1745.

He ought not to be confounded with *Michael Fourmont*, his youngeſt brother; who took orders, was profeſſor of the Syriac language in the Royal College, and a member of the Academy of Inſcriptions. He died in 1746.

FOURNESS, in Loynſdale, Lancaſhire is a track, between the Kent, Leven, and Dudden-Sands, which runs north parallel with the weſt ſides of Cumberland and Weſtmoreland; and on the ſouth runs out into the ſea as a promontory. Here, as Mr Camden expreſſes it, "the ſea, as if enraged at it, laſhes it more furiouſly, and in high tides has even devoured the ſhore, and made three large bays; *viz.* Kentſand, into which the river Ken empties itſelf; Levenſand and Duddenſand between which the land projects in ſuch a manner that it has its name thence; Foreneſs and Foreland, ſignifying the ſame with us as *promontorium anterius* in Latin." Biſhop Gibſon, however, derives the name of *Fourneſs*, or *Furneſs*, from the numerous furnaces, that were there are anciently, the rents and ſervices of which (called *bloomſmithy rents*) are ſtill paid. This whole tract, except on the coaſt, riſes in high hills and vaſt piles of rocks called *Forneſs-Fells*: among which the Britons found a ſecure retreat, truſting to theſe natural fortreſſes, though nothing was inacceſſible to the victorious Saxons: for we find the Britons ſettled here 228 years after the arrival of the Saxons: becauſe at that time Egfrid king of Northumberland gave St Cuthbert the land called *Carthmell*, and all the Britans in it, as is related in his life. In theſe mountainous parts are found quarries of a fine durable blue ſlate to cover buildings with, which are made uſe of in many other parts of the kingdom. Here are ſeveral cotton mills lately erected; and if fuel for fire were more plentiful, the trade of this country would much increaſe; but there being no coals nearer than Wigan or Whitehaven, and the coaſt-duties high, firing is rather ſcarce, the country people uſing only turf or peat, and that begins to be more ſcarce than formerly. In the moſſes of Fourneſs much fir is found, but more oak: the trunks in general lie with their heads to the eaſt, the high winds having been from the weſt. High Fourneſs has ever had great quantities of ſheep, which browſe upon the hollies left in great numbers for them; and produces charcoal for melting iron-ore, and oak-bark for tanners uſe, in great abundance. The foreſts abounded with deer and wild boars, and the *legh* or *ſcoſe*, or large ſtags, whoſe horns are frequently found under ground here. The low or plain part of Fourneſs which is ſo called to diſtinguiſhed it from the woody or mountainous part produces all ſorts of grain, but principally oats, whereof the bread eaten is in this country is generally made; and there are found here veins of a very rich iron-ore, which is not only melted and wrought here, but great quantities are exported to other parts to mix with poorer ores. The three ſands abovementioned are very dangerous to travellers by the tides and the many quickſands. There is a guide on horſeback appointed to Kent or Lancaſter ſand at 10 l. *per ann.* to Leven at 6 l. *per ann.* out of the public revenue; but to Dudden, which are moſt dangerous, none; and it is no uncommon thing for perſons to paſs over it in parties of 100 at a time like caravans, under the direction of the carriers, who go to or fro every day. The ſands are leſs dangerous than formerly, being more uſed and better known, and travellers never going without the carriers or guides. "Furnis abbey up in the mountains," was begun at Tulket in Amounderneſs 1124, by Stephen earl of Boulogne, afterwards king of England, for the monks of Savigni in France, and three years after removed to this valley, then called *Bekangeſgill*, or the vale of nightſhade." It was of the Ciſtertian order, endowed with above 800 l. *per ann.* Out of the monks of this abbey, Mr Camden informs us, the biſhops of the Iſle of Man, which lies over againſt it, uſed to be choſen by ancient cuſtom; it being as it were the mother of many monaſteries in Man and Ireland. Some ruins, and part of the foſſe which ſurrounded the monaſtery, are ſtill to be ſeen at Tulket. The remains at Fourneſs breathe that plain ſimplicity of the Ciſtertian abbeys; the chapter-houſe was the only piece of elegant gothic about it, and its roof has lately fallen in. Part of the painted glaſs from the eaſt window, repreſenting the crucifixion, &c. is preſerved at Winder-mere church in Bowlneſs, Weſtmoreland. The church (except the north ſide of the nave), the chapter-houſe, refectory, &c. remain, only unroofed.

FOURTH REDUNDANT, in muſic. See INTERVAL.

FOWEY, or FOY, a town of Cornwall in England, 240 miles from London, with a commodious haven on the Channel. It is a populous place, extending above one mile on the eaſt ſide of a river of its own name; and has a great ſhare in the fiſhing trade, eſpecially pilchards. It roſe ſo much formerly by naval wars and piracies, that in the reign of Edward III. its ſhips refuſing to ſtrike when required as they ſailed by Rye and Winchelſea, were attacked by the ſhips of thoſe ports, but defeated them; whereupon they bore their arms mixed with the arms of thoſe two cinque ports, which gave riſe to the name of the "Gallants of Fowey." And we learn from Camden, that this town quartered a part of the arms of every one of the cinque-ports with their own; intimating, that they had at times triumphed over them all: and indeed once they were ſo powerful, that they took ſeveral of the French men of war. In the reign of Edward III. they reſcued certain ſhips of Rye from diſtreſs, for which this town was made a member of the cinque-ports. Edward IV. favoured Fowey ſo much, that when the French threatened to come up the river to burn it, he cauſed two towers, the ruins of which are yet viſible, to be built at the public charge for its ſecurity: but he was afterwards ſo diſguſted with the inhabitants for attacking the French after a truce proclaimed with Louis XI. that he took away all their ſhips and naval ſtores, together with a chain drawn acroſs the river between the two forts abovementioned, which was carried to Dartmouth. It is ſaid they were ſo inſolent, that they cut off the ears of the king's purſuivants: for which ſome lives were forfeited as well as eſtates. The corporation conſiſts of a mayor, recorder, 8 aldermen, a town-clerk, and 2 aſſiſtants. The market is Saturday, the fairs May-day and Sept. 10. Here are a fine old church, a free-ſchool and an hoſpital. The toll of the market and fairs, and keyage of the harbour, were veſted in the corporation on the payment of a fee-farm rent of about 40s. It does not appear to have ſent members to parliament before the 13th of Queen Elizabeth. Here is a coinage for the tin; of which a great quantity is dug in the country to the north and weſt of it. The river Foy, or Foath, is very broad and deep here, and was formerly navigable as high as Leſtwithiel. W. Long. 5°, N. Lat. 50. 27.

FOWL, among zoologiſts, denotes the larger ſorts of birds, whether domeſtic or wild: ſuch as geeſe, pheaſants, patridges, turkey, ducks, &c.

Tame fowl make a neceſſary part of the ſtock of a country farm. See the article POULTRY.

Fowls are again diſtinguiſhed into two kinds, *viz.* *land* and *water* fowl, theſe laſt being ſo called from their living much in and about water: alſo into thoſe which are accounted *game*, and thoſe which are not. See the article GAME.

FOWLING, the art of catching birds by means of bird-lime, decoys, and other devices, or the killing of them by the gun. See *BIRD-Catching*, *BIRL-Lime*, DECOY, SHOOTING, and the names of the different birds in the order of the alphabet.

FOWLING, is alſo uſed for the perſuing and taking birds with hawks, more properly called FALCONRY or HAWKING. See theſe articles.

FOWLING-Piece, a light gun for ſhooting birds. That piece is always reckoned beſt which has the longeſt barrel, from 5½ to 6 feet, with a moderate bore; though every fowler ſhould have them of different ſizes, ſuitable to the game he deſigns to kill. The barrel ſhould be well poliſhed and ſmooth within, and the bore of an equal bigneſs from one end to the other; which may be proved by putting in a piece of paſteboard, cut of the exact roundneſs of the top: for if this goes down without ſtops or ſlipping you may conclude the bore good. The bridge-pan muſt be ſomewhat above the touch-hole, and ought to have a notch to let down a little powder: this will prevent the piece from recoiling, which it would otherwiſe be apt to do. As to the locks, chooſe ſuch as are well filed with true work, whoſe ſprings muſt be neither too ſtrong nor too weak. The hammer ought to be well hardened and pliable to go down to the pan with a quick motion.

FOX, in zoology. See CANIS.

The fox is a great nuiſance to the huſbandman, by taking away and deſtroying his lambs, geeſe, poultry, &c. The common way to catch him is by gins; which being baited, and a train made by drawing raw fleſh acroſs in his uſual paths or haunts to the gin, it proves an inducement to bring him to the place of deſtruction.

The fox is alſo a beaſt of chace, and is taken with grehounds, tarriers, &c. See the article HUNTING,

FOX (John), the martyrologiſt, was born at Boſton in Lincolnſhire in the year 1517. At the age of 16 he was entered a ſtudent of Brazen-noſe college in Oxford; and in 1543 he proceeded maſter of arts, and was choſen, fellow of Magdalen college. He diſcovered an early genius for poetry, and wrote ſeveral Latin comedies, the ſubjects taken from ſcripture, which his ſon aſſures us were written in an elegant ſtyle. Forſaking the muſes, he now applied himſelf with uncommon aſſiduity to the ſtudy of divinity, particularly church-hiſtory; and, diſcovering a premature propenſity to the doctrine of reformation, he was expelled the college as an heretic. His diſtreſs on this occaſion was very great; but it was not long before he found an aſylum in the houſe of Sir Thomas Lucy of Warwickſhire, who employed him as a tutor to his children. Here he married the daughter of a citizen of Coventry. Sir Thomas's children being now grown up, after reſiding a ſhort time with his wife's father, he came to London; where finding no immediate means of ſubſiſtence, he was reduced to the utmoſt degree of want; but was at length (as his ſon relates) miraculouſly relieved in the following manner: As he was one day ſitting in St Paul's church, emaciated with hunger, a ſtranger accoſted him familiarly, and, bidding him be of good cheer, put a ſum of money into his hand; telling him at the ſame time, that in a few days new hopes were at hand. He was ſoon after taken into the family of the ducheſs of Richmond, as tutor to the earl of Surrey's children, who, when their father was ſent to the tower, were committed to her care. In this family he lived, at Ryegate in Surrey, during the latter part of the reign of Henry VIII. The entire reign of Edward VI. and part of that of queen Mary; but at length, perſecuted by his implacable enemy biſhop Gardiner, he was obliged to ſeek refuge abroad. Baſil in Switzerland was the place of his retreat, where he ſubſiſted by correcting the preſs. On the death of queen Mary he returned to England; where he was graciouſly received by his former pupil the duke of Norfolk, who retained him in his family as long as he lived, and bequeathed him a penſion at his death. Mr ſecretary Cecil alſo obtained for him the rectory of Shipton near Saliſbury; and we are aſſured that he might have had conſiderable church preferment, had it not been for his unwillingneſs to ſubſcribe to the canons. He died in the year 1587, in the 70th year of his age; and was buried in the chancel of St Giles's, Cripplegate. He was a man of great induſtry, and conſiderable learning; a zealous, but not a violent reformer; a nonconformiſt, but not an enemy to the church of England. He left two ſons; one of which was bred a divine, the other a phyſician. He wrote many pieces: but his principal work is, the Acts and monuments of the Church, &c. commonly called *Fox's Book of Martyrs*. His facts are not always to be depended on, and he often loſes his temper; which, conſidering the ſubject, is not much to be wondered at.

FOX (George), the founder of the ſect of Engliſh Quakers, was a ſhoemaker in Nottingham. The accounts of thoſe times tell us, that as he wrought at his trade, he uſed to meditate much on the ſcriptures: which, with his ſolitary courſe of life, improving his natural melancholy, he began at length to fancy himſelf inſpired; and in conſequence thereof ſet up for a preacher.

He propoſed but few articles of faith; inſiſting chiefly on moral virtue, mutual charity, the love of God, and a deep attention to the inward motions and ſecret operations of the ſpirit: he required a plain ſimple worſhip, and a religion without ceremonies, making it a principal point to wait in profound ſilence the directions of the Holy Spirit. Fox met with much rough treatment for his zeal, was often impriſoned, and ſeveral times in danger of being knocked on the head. But all diſcouragements notwithſtanding, his ſect prevailed much, and many conſiderable men were drawn over to them; among whom were BARCLAY and PENN. He died in 1681. His followers were called *Quakers*, in deriſion of ſome unuſual ſhakings and convulſions with which they were ſeized at their firſt meetings. See the article QUAKERS.

Fox-Glove, in botany. See DIGITALIS.

Fox-Iſlands, the name of a groupe of iſlands, 16 in number, ſituated between the eaſtern coaſt of Kamtſchatka and the weſtern coaſt of the continent of America. Each iſland has a particular name; but the general name *Fox-iſlands* is given to the whole group, on account of the great number of black, grey, and red foxes with which they abound. The dreſs of the inhabitants conſiſts of a cap and a fur coat, which reaches down to the knee. Some of them wear common caps of a party-coloured bird-ſkin, upon which they leave part of the wings and tail. On the fore-part of their hunting and fiſhing caps, they place a ſmall board like a ſcreen, adorned with the jaw-bones of ſea-bears, and ornamented with glaſs-beads, which they receive in barter from the Ruſſians. At their feſtivals and dancing parties they uſe a much more ſhowy ſort of caps. They feed upon the fleſh of all ſorts of ſea-animals, and generally eat it raw. But if at any time they chooſe to dreſs their victuals, they make uſe of a hollow ſtone; having placed the fiſh or fleſh therein, they cover it with another, and cloſe the interſtices with lime or clay. They then lay it horizontally upon two ſtones, and light a fire under it. The proviſion intended for keeping is dried without ſalt in the open air. Their weapons conſiſt of bows, arrows, and darts; and for defence they uſe wooden ſhields.—The moſt perfect equality reigns among theſe iſlanders. They have neither chiefs nor ſuperiors, neither laws nor puniſhments. They live together in families, and ſocieties of ſeveral families united, which form what they call a *race*, who, in caſe of an attack or defence, mutually help and ſupport each other. The inhabitants of the ſame iſland always pretend to be of the ſame race; and every perſon looks upon his iſland as a poſſeſſion, the property of which is common to all the individuals of the ſame ſociety. Feaſts are very common among them, and more particularly when the inhabitants of one iſland are viſited by thoſe of the others. The men of the village meet their gueſts beating drums, and preceded by the women, who ſing and dance. At the concluſion of the dance, the hoſts ſerve up their beſt proviſions, and invite their gueſts to partake of the feaſt. They feed their children when very young with the coarſeſt fleſh, and for the moſt part raw. If an infant cries, the mother immediately carries it to the ſea-ſide, and whether it be ſummer or winter, holds it naked in the water until it is quiet. This cuſtom is ſo far from doing the children any harm, that it hardens them againſt the cold, and they accordingly go barefooted through the winter without the leaſt inconvenience. They ſeldom heat their dwellings; but when they are deſirous of warming themſelves, they light a bundle of hay, and ſtand over it; or elſe they ſet fire to train-oil, which they pour into a hollow ſtone. They have a good ſhare of plain natural ſenſe, but are rather ſlow of underſtanding. They ſeem cold and indifferent in moſt of their actions; but let an injury, or even a ſuſpicion only, rouſe them from this phlegmatic ſtate, and they become inflexible and furious, taking the moſt violent revenge without any regard to the conſequences. The leaſt affliction prompts them to ſuicide; the apprehenſion of even an uncertain evil often leads them to deſpair; and they put an end to their days with great apparent inſenſibility.

FRACASTOR (Jerome), a moſt eminent Italian poet and phyſician, was born at Verona in the year 1482. Two ſingularities are related of him in his infancy: one is, that his lips adhered ſo cloſely to each other when he came into the world, that a chirurgeon was obliged to divide them with his inciſion-knife; the other, that his mother was killed with lightning, while he, though in her arms at the very moment, eſcaped unhurt. Fracaſtor was of parts ſo exquiſite, and made ſo wonderful a progreſs in every thing he undertook, that he became eminently ſkilled not only in the belles lettres, but in all arts and ſciences. He was a poet, a philoſopher, a phyſician, an aſtronomer, a mathematician, and what not? He was a man of vaſt conſequence in his time; as appears from pope Paul III.'s making uſe of his authority to remove the council of Trent to Bolougne, under the pretext of a contagious diſtemper, which, as Fracaſtor depoſed, made it no longer ſafe to continue at Trent. He was intimately acquainted with cardinal Bembus, Julius Scaliger, and all the great men of his time. He died of an apoplexy at Caſi near Verona, in 1553: and in 1559, the town of Verona erected a ſtatue in honour of him.

He was the author of many performances, both as a poet and as a phyſician; yet never man was more diſintereſted in both theſe capacities than he: evidently ſo as a phyſician, for he practiſed without fees; and as a poet, whoſe uſual reward is glory, nothing could be more indifferent. It is owing to this indifference, that we have ſo little of his poetry, in compariſon of what he wrote; and that, among other compoſitions, his Odes and Epigrams, which were read in manuſcript with infinite admiration, yet, never paſſing the preſs, were loſt. What we have now of his, are the three books of "Siphilis, or of the French diſeaſe;" a book of Miſcellaneous Poems; and two books of his poem, intitled, *Joſeph*, which he began at the latter end of his life, but did not live to finiſh, And theſe works, it is ſaid, would have periſhed with the reſt, if his friends had not taken care to preſerve and communicate copies of them: For Fracaſtor, writing merely for amuſement, never troubled himſelf in the leaſt about what became of his works after they once got out of his hands. Fracaſtor compoſed alſo a poem, called *Alcon, ſive de cura canum venaticorum.* His poems as well as his other works are written all in Latin. His medical pieces are, *De Sympathia & Antipathia,—De contagione & contagionis morbis,—De cauſis criticorum dierum,—De vini temperatura,* &c. His works have been printed ſeparately and collectively. The beſt edition of them is that of Padua 1735, in 2 vols 4to.

FRACHES, in the glaſs trade, are the flat iron pans into which the glaſs veſſels already formed are put when in the tower over the working-furnace, and by means of which they are drawn out through the leers, that they may be taken gradually from the fire, and cool by degrees.

FRACTION, in arithmetic and algebra, a part or diviſion of an unit or integer; or a number which ſtands to an unit in the relation of a part to its whole. The word literally imports a broken number.

Fractions are uſually divided into decimal, ſexageſimal, and vulgar. See ALGEBRA and ARITHMETIC.

FRACTURE, in ſurgery, a rupture of a bone or a ſolution of continuity in a bone when it is cruſhed or broken by ſome external cauſe. See SURGERY.

FRÆNUM, or FRENUM, *Bridle,* in anatomy, a name given to divers ligaments, from their office in retaining and curbing the motions of the parts they are fitted to.

FRÆNUM Linguæ, or *Bridle of the Tongue*; a membranous ligament, which ties the tongue to the os hyoides, larynx, fauces, and lower parts of the mouth. In ſome ſubjects the *frænum* runs the whole length of the tongue to the very tip; in which caſes, if it were not cut, it would take away all poſſibility of ſpeech. See *TONGUE-Tied.*

FRÆNUM Penis, a ſlender ligament, whereby the prepuce is tied to the lower part of the glans of the penis. Nature varies in the make of this part; it being ſo ſhort in ſome, that unleſs divided it would not admit of perfect erection. There is alſo a kind of little *frænum,* faſtened to the lower part of the clitoris.

FRAGA, a ſtrong town with a handſome caſtle in the kingdom of Arragon in Spain. It is ſtrong by ſituation among the mountains; having the river Cinca before it, whoſe high banks are difficult of acceſs; and at its back a hill, which cannot eaſily be approached with large cannon. Alphonſo VII. king of Arragon, and the firſt of that name of Caſtile, was killed by the Moors in 1134, when he beſieged this town. E. Long. 0. 23. N. Lat. 41. 28.

FRAGARIA, the STRAWBERRY: A genus of the polygynia order, belonging to the icoſandria claſs of plants; and in the natural method ranking under the 35th order, *Senticoſæ.* The calyx is decemfid; the petals five; the receptacle of the ſeeds ovate, in the form of a berry, and deciduous. There is but one ſpecies, *viz.* the veſca, or cultivated ſtrawberry. The principal varieties are, 1. The ſylveſtris, or wood-ſtrawberry, with oval ſawed leaves, and ſmall round fruit. 2. The Virginian ſcarlet, or Virginia ſtrawberry, with oblong oval ſawed leaves, and a roundiſh ſcarlet-coloured fruit. 3. The Moſchata, or hautboy, or muſky ſtrawberry, having oval, lanceolate, rough leaves, and large pale-red fruit. 4. The Chiloenſis, or Chili ſtrawberry, with large, oval, thick, hairy leaves, large flowers, and very large firm fruit. 5. The Alpina, Alpine, or monthly ſtrawberry, having ſmall oval leaves, ſmall flowers, and moderate-ſized, oblong, pointed fruit.

All theſe varieties are hardy, low, perennials, durable in root, but the leaves and fruit-ſtalks are renewed annually in ſpring. They flower in May and June, and their fruit comes to perfection in June, July, and Auguſt; the Alpine kind continuing till the beginning of winter. They all proſper in any common garden ſoil, producing abundant crops annually without much trouble. They increaſe exceedingly every ſummer, both by off-ſets or ſuckers from the ſides of the plants, and by the runners or ſtrings, all of which rooting and forming plants at every joint, each of which ſeparately planted bears a few fruit the following year, and bear in great perfection the ſecond ſummer. Thoſe of the Alpine kind will even bear fruit the ſame year that they are formed. All the ſorts are commonly cultivated in kitchen-gardens, in beds or borders of common earth, in rows lengthwiſe 15 or 18 inches diſtance; the plants the ſame diſtance from one another in each row. Patches of the different ſorts diſpoſed here and there in the fronts of the different compartments of the pleaſure-ground, will appear ornamental both in their flowers and fruit, and make an agreeable variety.

Strawberries eaten either alone, or with ſugar and milk, are univerſally eſteemed a moſt delicious fruit. They are grateful, cooling, ſubacid, and juicy. Tho' taken in large quantities, they ſeldom diſagree. They promote perſpiration, impart a violet ſmell to the urine, and diſſolve the tartareous incruſtations on the teeth. People afflicted with the gout or ſtone have found relief by uſing them very largely; and Hoffman ſays, he has known conſumptive people cured by them. The bark of the root is aſtringent.—Sheep and goats eat the plant; cows are not fond of it; horſes and ſwine refuſe it.

FRAGUIER (Glaude Francis), a polite and learned French writer, born at Paris, of a noble family, in 1666. He was eduated under the Jeſuits, and was even admitted into the order, though he afterwards quitted it; and being thus at liberty to follow his inclinations, he ſoon after aſſiſted the Abbé Bignon in conducting the *Journal de Sçavans*, having all the qualifications for ſuch a work. His works conſiſt of Latin poems, and a great number of very excellent diſſertations. He died in 1728.

FRAIL, a baſket made of ruſhes or the like, in which are packed up figs, raiſins, &c. It ſignifies alſo a certain quantity of raiſins, about 75 pounds.

FRAISE, in fortification, a kind of defence, conſiſting of pointed ſtakes, ſix or ſeven feet long, driven parallel to the horizon in the retrenchments of a camp, a half moon, or the like, to prevent any approach or ſcalade.

Fraiſes differ from paliſades chiefly in this, that the latter ſtand perpendicular to the horizon, and the former jet out parallel to the horizon, or nearly ſo, being uſually made a little ſloping, or with the points hanging down. Fraiſes are chiefly uſed in retrenchments and other works thrown up of earth; ſometimes they are found under the parapet of a rampart, ſerving inſtead of the cordon of ſtone uſed in ſtone-works.

To FRAISE *a Battalion*, is to line the muſqueteers round with pikes, that in caſe they ſhould be charged with a body of horſe, the pikes being preſented, may cover the muſqueteers from the ſhock, and ſerve as a barricade.

FRAME, in joinery, a kind of caſe, wherein a thing is ſet or incloſed, or even ſupported; as a window-frame, a picture-frame, &c.

FRAME is alſo a machine uſed in divers arts; as,

FRAME, among printers, is the ſtand which ſupports the caſes. See CASE.

FRAME, among founders, a kind of ledge incloſing a board; which, being filled with wetted ſand, ſerves as a mould to caſt their works in. See FOUNDERY.

FRAME is more particularly uſed for a ſort of loom, whereon artificers ſtretch their linens, ſilks, ſtuffs, &c. to be embroidered, quilted, or the like.

FRAME, among painters, a kind of ſquare, conſiſting of four long ſlips of wood joined together, whoſe intermediate ſpace is divided by threads into ſeveral little ſquares like a net; and hence ſometimes called *reticula*. It ſerves to reduce figures from great to ſmall; or on the contrary, to augment their ſize from ſmall to great.

FRAMLINGHAM, a town of Suſſex, 88 miles from London. It is a large old place, with a caſtle, ſuppoſed to have been built by ſome of the firſt kings of the Eaſt-Angles; the walls yet ſtanding, are 44 feet high, 8 thick, with thirteen towers 14 feet above them, 2 of which are watch-towers. To this caſtle the princeſs, afterwards queen Mary I. retired, when the Lady Jane Grey was her competitor for the crown.

The town is pleaſantly ſituated, though but indifferently built, upon a clay hill, in a fruitful ſoil and a healthy air, near the ſource of the river Ore, by ſome called Wincknel, which runs through it to Orford. It has a ſpacious place for the market on Saturday; and a large ſtately church built all of black flint, with a ſteeple 100 feet high; two good alms-houſes; and a free-ſchool.

FRANC. See FRANK.

FRANCE, a large kingdom of Europe, ſituated between 5° W. and 7° E. Long. and between 43° and 51° N. Lat. being bounded by the Engliſh channel and the Auſtrian Netherlands on the north; by Germany, Switzerland, Savoy, and Piedmont, in Italy, on the eaſt; by the Mediterranean ſea, and the Pyrenean mountains, which ſeparate it from Spain, on the ſouth; and by the bay of Biſcay on the weſt.

1
First ſubdued by Julius Cæſar.

The kingdom of France was originally poſſeſſed by the *Celtes* or *Gauls*. They were a very warlike people, and often checked the progreſs of the Roman arms: nor did they yield till the time of Julius Cæſar, who totally ſubdued their country, and reduced it to the form of a Roman province *. The Romans continued in quiet poſſeſſion of Gaul, as long as their empire retained its ſtrength, and they were in a condition to repreſs the incurſions of the German nations, whom even in the zenith] of their power they had not been able to ſubdue. But in the reign of the emperor Valerian, the ancient Roman valour and diſcipline had begun to decline, and the ſame care was not taken to defend the provinces as formerly. The barbarous nations, therefore, began to make much more frequent incurſions; and among the reſt the *Franks*, a German nation inhabiting the banks of the Rhine, proved particularly troubleſome. Their origin is variouſly accounted for; but the moſt probable ſuppoſition is, that about the time of the emperor Gordian, the people inhabiting the banks of the Lower Rhine entered into a confederacy with thoſe who dwelt on the Weſer, and both together aſſumed the name of *Franks* or *Freemen*. Their firſt irruption, we are told by Valeſius, happened in the year 254, the ſecond of Valerian's reign. At this time they were but few in number; and were repulſed by Aurelian, afterwards emperor.

* See *Gaul*.

2
Invaded by the Franks.

France.

Not diſcouraged by this check, they returned two years after in far greater numbers; but were again defeated by Gallienus, whom Valerian had choſen for his partner in the empire. Others, however, continued to pour in from their native country in ſuch multitudes, that Gallienus, no longer able to drive them out by force of arms, made advantageous propoſals to one of their chiefs, whom he engaged to defend the frontiers againſt his countrymen as well as other invaders.

This expedient did not long anſwer the purpoſe. In 260 the Franks, taking advantage of the defeat and captivity of Valerian in Perſia, broke into Gaul, and afterwards into Italy, committing every where dreadful ravages. Five years afterward they invaded Spain; which they poſſeſſed, or rather plundered, for the ſpace of 12 years; nor could they be driven out of Gaul till the year 275, when the emperor Probus not only gave them a total overthrow in that country, but purſued them into their own, where he built ſeveral forts to keep them in awe. This intimidated them ſo much, that nine of their kings ſubmitted to the emperor, and promiſed an annual tribute.—They continued quiet till the year 287; when in conjunction with the Saxon pirates they plundered the coaſts of Gaul, carrying off an immenſe booty. To revenge this inſult, the emperor Maximian entered the country of the Franks the following year, where he committed ſuch ravages that two of their kings ſubmitted to him; and to many of the common people who chooſe to remain in Gaul, he allowed lands in the neighbourhood of Treves and Cambray.

The reſtleſs diſpoſition of the Franks, however, did not allow them to remain long in quiet. About the year 293, they made themſelves maſter of Batavia and part of Flanders; but were entirely defeated, and forced to ſurrender at diſcretion, by Conſtantius the father of Conſtantine the Great, who tranſplanted them into Gaul. Their countrymen in Germany continued quiet till the year 306, when they renewed their depredations; but being overcome by Conſtantine the Great, two of their kings were taken priſoners, and thrown to the wild beaſts in the ſhows exhibited on that occaſion.

All theſe victories, however, as well as many others ſaid to have been gained by the Romans, were not ſufficient to prevent the incurſions of this reſtleſs and turbulent nation; inſomuch that in the year 335, they had made themſelves maſters of 40 cities in the province of Gaul. Soon after, they were totally defeated by the emperor Julian, and again by count Theodoſius, father to the emperor of that name; but, in the year 388, they ravaged the province with more fury than ever, and cut off a whole Roman army that was ſent againſt them. As the weſtern empire was at this time in a very low ſtate, they for ſome time found more interruption from other barbarians than from the Romans, till their progreſs was checked by Aetius.

3
Pharamond the firſt king.

When the war with Aetius broke out, the Franks were governed by one *Pharamond*, the firſt of their kings of whom we have any diſtinct account. He is ſuppoſed to have reigned from the year 417 or 418, to 428; and is thought by archbiſhop Uſher to have been killed in the war with Aetius. By ſome he is ſuppoſed to have compiled the Salic Laws, with the aſſiſtance of four ſages named *Wiſegaſt*, *Loſegaſt*, *Widegaſt*, and *Solegaſt*. But Valeſius is of opinion that the Franks had no written laws till the time of Clovis.

4
Clodio.

Pharamond was ſucceeded by his ſon Clodio, who likewiſe carried on a war againſt the Romans. He is ſaid to have received a terrible overthrow from Aetius near the city of Lens; notwithſtanding which, he advanced to Cambray, and made himſelf maſter of that city, where for ſome time he took up his reſidence. After this he extended his conqueſts as far as the river Somme, and deſtroyed the cities of Treves and Cologne, Tournay and Amiens. He died in the year 448, and was ſucceeded by Merovæus.

5
Merovæus.

Authors are not agreed whether the new king was brother, or ſon, or any relation at all, to Clodio. It ſeems probable indeed, that he was of a different family; as from him the firſt race of French kings were ſtyled *Merovingian*. He was honoured and reſpected by his people, but did not greatly enlarge the boundaries of his kingdom. He died in 458.

6
Childeric.

Merovæus was ſucceeded by his ſon Childeric, who being no longer kept in awe by Aetius, made war on the Romans, and extended his conqueſts as far as the river Loire. He is ſaid to have taken the city of Paris after a ſiege of five years, according to ſome, and of ten, according to others. The Roman power was now totally deſtroyed in Italy; and therefore *Clodovæus*, *Clovis*, or *Louis*, for his name is differently written, who ſucceeded Childeric, ſet himſelf about making an entire conqueſt of Gaul. Part of the province was ſtill retained by a Roman named *Syagrius*, who probably had become ſovereign of the country on the downfal of the weſtern empire in 476. He was defeated and taken priſoner by Clovis, who afterwards cauſed him to be beheaded, and ſoon after totally reduced his dominions.

7
French monarchy eſtabliſhed by Clovis.

Thus was the French monarchy eſtabliſhed by Clovis in the year 487. He now poſſeſſed all the country lying between the Rhine and the Loire; which, though a very extenſive dominion, was yet conſiderably inferior to what it is at preſent.

Clovis had been educated in the Pagan religion, and continued in that profeſſion till the 30th year of his age; notwithſtanding which he allowed his ſubjects full liberty of conſcience. Having married, however, Clotilda, daughter of the duke of Burgundy, this princeſs, who was a zealous Chriſtian, uſed all her influence with her huſband to perſuade him to embrace her religion. For ſome time he continued to waver; but happening to gain a battle, where, being in great danger, he had invoked the god of Clotilda and the Chriſtians, he afterwards gave ſuch a favourable ear to the diſcourſes of Remigius biſhop of Rheims that he ſoon declared himſelf a convert, and was baptiſed in the year 496. His acknowledgment of the truths of the goſpel was not followed by any amendment of life: on the contrary, he employed the remainder of his life in the aggrandiſement of himſelf and extenſion of his dominions by the moſt abominable treachery, fraud, and violence. In his attacks on Armorica he proved unſucceſsful. The inhabitants of this country, which comprehended the maritime part of ancient Gaul lying between the Rivers Seine and Loire, had united for their defence; and though abandoned by the Romans,

mans, made a powerful defence againſt the barbarians who aſſaulted them on all ſides. Clovis, finding them too powerful to be ſubdued by force, propoſed an union with his people, which they readily accepted, and this the more eaſily on account of his profeſſing the Chriſtain religion. Thus the Chriſtianity of Clovis in ſeveral inſtances proved ſubſervient to the purpoſes of his ambition, and his power became gradually very formidable. The Burgundians at this time poſſeſſed all the country from the foreſt of Voſges to the ſea of Marſeilles, under Gondebaud the uncle of Clotilda; who to ſecure his own authority, had put to death two of his brothers, one of whom was the father of the French queen. The third brother, *Godageſil*, whom he had ſpared and allowed to poſſeſs the principality of Geneva, conſpired with Clovis to drive him from his dominions. A war having commenced between the French and Burgundian monarchs, the latter was defeated in a battle by Godageſil, and obliged to fly to Avignon, leaving his antagoniſt maſter of the cities of Lyons and Vienne. The victor next laid ſiege to Avignon; but it was defended with ſuch vigour, that Clovis at laſt thought proper to accept of a ſum of money and an annual tribute from Gondebaud; who was likewiſe obliged to cede to Godageſil the city of Vienne, and ſeveral other places taken during the war.

Gondebaud no ſooner found himſelf at liberty from his enemies, than he aſſembled a powerful army; with which he advanced towards Vienne, where Godageſil himſelf reſided at that time. The place was garriſoned by 5000 Franks, and might have made conſiderable reſiſtance; but Gondebaud being admitted through the ſubterraneous paſſage of an aqueduct, maſſacred moſt of the Franks, ſent the reſt priſoners to the king of the Viſigoths, and put Godageſil to death. This was quickly followed by the ſubmiſſion of all the other places which had owned the authority of Godageſil: and Gondebaud, now thinking himſelf able to reſiſt the power of Clovis, ſent a meſſage to inform him, that he muſt no longer expect the promiſed tribute; and though Clovis was very much mortified with this defection, he found himſelf obliged for the preſent to put up with the injury, and accept of the alliance and military ſervice of the king of Burgundy.

His next expedition was againſt the Viſigoths, who poſſeſſed conſiderable territories on both ſides of the Pyrenean mountains. His motives for this undertaking were expreſſed in the following ſpeech to his nobility when aſſembled in the city of Paris, which he conſidered as the capital of his dominions. "It is with concern (ſaid the religious monarch) that I ſuffer the Arians to poſſeſs the moſt fertile part of Gaul; let us, with the aid of God, march againſt them; and having conquered them, annex their kingdom to our dominions." The nobility approved of the ſcheme; and Clovis marched againſt a prince for whom he had but lately profeſſed the greateſt regard, vowing to erect a church in honour of the holy apoſtles, if he ſucceeded in his enterpriſe. Alaric the king of the Viſigoths was a young man deſtitute of military experience, though perſonally brave. He did not therefore heſitate at engaging his antagoniſt; but, unable to contend with the veteran troops of Clovis, his army was utterly defeated on the banks of the Clain, 10 miles ſouth of Poictiers, in the year 507. Alaric, perceiving the ruin of his troops, ruſhed againſt Clovis in perſon, by whom he was killed, and the remainder of the army purſued for ſome time with great ſlaughter. After this victory the province of Aquitain ſubmitted, and Clovis eſtabliſhed his winter quarters at Bourdeaux. Tholouſe ſurrendered next ſpring; and the royal treaſures of the Viſigoths were tranſported to Paris. Angouleme was next reduced, and the city of Arles inveſted. But here the victorious career of Clovis was ſtopped by Theodoric king of the Oſtrogoths, who had overturned the dominion of Odoacer in Italy. He had married Abolfleda the ſiſter of Clovis, but had alſo given his own daughter in marriage to the king of the Viſigoths, and had endeavoured, as much as was in his power, to preſerve a good underſtanding between the two ſovereigns. Finding this impoſſible, however, and that no bounds could be ſet to the ambition of Clovis, he ſent one of his generals with a powerful army againſt him; by whom the French monarch was defeated with the loſs of 30,000 men. By this misfortune Clovis was obliged to raiſe the ſiege of Arles with precipitation: however the Franks ſtill retained the greateſt part of their conqueſts, and the province of Aquitain was indiſſolubly annexed to their impire.

8
Is honoured with the title of *Roman Conſul.*

In 509, Clovis had the title of Roman conſul; by which means the people of Rome were inſenſibly led to pay a peculiar regard to the French monarchs: and Clovis was now ſuppoſed to be inveſted with a juſt title to all his conqueſts in whatever manner they had been acquired. He was ſolemnly inveſted with his new dignity in the church of St Martin in the city of Tours; after which he entered the cathedral clothed in a purple tunic and mantle, the badges of his office.

Clovis now proceeded to augment his power by the murder of his kinſmen the princes of the Merovingian race. Among thoſe who periſhed on this occaſion were Sigibert king of Cologne, with his ſon Cloderic, Cararic, another prince whoſe dominions have not been accurately pointed out by hiſtorians; Ranacaire, who governed the preſent dioceſe of Cambray; and Renomer king of the territory of Maine. All theſe Murders, however, were expiated, according to the views of the clergy of thoſe times, by the great zeal he expreſſed in the cauſe of Chriſtianity, and his liberality to the church.

Clovis died in the year 511, after having reformed and publiſhed the Salic laws: a few lines of which, debarring women from inheriting any part of the Salic lands, have been extended ſo far as to deprive the females of the royal family of France of their right of ſucceſſion to the throne of that kingdom.

9
His dominions divided among his children.

Clovis was buried in the church of St Peter and St Paul, now Genevieve, in the city of Paris, where his tomb is ſtill to be ſeen. His dominions were divided among his four ſons. Thieri, or Theodoric, the eldeſt, had the eaſtern part of the empire; and, from his making the city of Metz his capital, is commonly called the *king of Metz*. Clodomir, the eldeſt ſon by Clotilda, had the kingdom of Orleans; Childebert, and Clotaire, who were both infants, had the kingdoms of Paris and Soiſſons, under the tutelage of their mother. The prudence of Clotida kept matters quiet in all the parts of the empire for eight years; but about the year 520, a numerous fleet of Danes arrived at the mouth of the Meuſe; and their king Cochiliac, having landed his forces, began to deſtroy the country with fire and ſword. Againſt him Thieri ſent his ſon Theodobert, who defeated the Daniſh army and navy, and killed their king, forcing the reſt to retire with precipitation.

In 522, Hermanfroi king of Thuringia, having deſtroyed one of his brethren named *Berthaire*, and ſeized on his dominions, applied to Thieri for aſſiſtance againſt his other brother Balderic, whom he intended to treat in the ſame manner. In this infamous enterpriſe Thieri embarked, on condition that he ſhould have one half of Balderic's dominions; but after the unhappy prince was evercome and killed in battle, Hermanfroi ſeized all his dominions. Thieri had no opportunity of revenging himſelf till the year 531; when perceiving the power of the Oſtrogoths, whom he much dreaded, to conſiderably leſſened by the death of king Theodric, he engaged his brother Clotaire to aſſiſt him: and they accordingly entered Thuringia with two powerful armies. They joined their forces as ſoon as they had paſſed the Rhine, and were quickly after reinforced by a conſiderable body of troops under the command of Theodobert. The allies attacked the army of Hermanfroi, which was advantageouſly poſted; and having totally defeated it, he was forced to fly from place to place to place in diguiſe. Soon after this the capital was taken, and Hermanfroi himſelf being invited to a conference by Theri, was treacherouſly murdered; after which his extenſive dominions became feudatory to Thieri.

In the mean time, Clotilda had excited her children to make war on the Burgundians, in order to revenge the death of her father Chilperic, whom Gondebaud king of Burgundy had cauſed to be murdered. Gondebaud was now dead, and had left his dominions to his ſons Sigiſmund and Godemar. Sigiſmund's forces were quickly defeated; and he himſelf was ſoon after delivered up his own ſubjects to Clodomir, who cauſed him to be thrown into a pit, where he periſhed miſerably. By his death Godemar became ſole maſter of Burgundy. Clodomir marched againſt him, and defeated him; but purſuing his victory too eagerly, was ſurrounded by his enemies and ſlain. After the reduction of Thuringia however, Childebert and Clotaire entered the kingdom of Burgundy at the head of a powerful army, and in 534 completed the conqueſt of it; in which, according to ſome, Godemar was killed; according to others, he retired into Spain, and from thence into Africa.

10
Clotaire becomes ſole monarch.

In 560 Clotaire became ſole monarch of France. He had murdered the ſons of Clodomir, who was killed in Burgundy as above related. Thieri and his children were dead, as was alſo Childebert; ſo that Clotaire was ſole heir to all the dominions of Clovis. He had five ſons; and the eldeſt of them, named *Chramnes*, had ſome time before rebelled againſt his father in Auvergne. As long as Childebert lived, he ſupported the young prince; but on his death, Chramnes was obliged to implore his father's clemency. He was at this time pardoned; but he ſoon began to cabal afreſh, and enengaged the count of Bretagne to aſſiſt him in another rebellion. The Bretons, however, were defeated, and Chramnes determined to make his eſcape; but perceiving that his wife and children were ſurrounded by his father's troops, he attempted to reſcue them. In this attempt he was taken priſoner, and with his family was thruſt into a thatched cottage near the field of battle; of which the king was no ſooner informed, than he commanded the cottage to be ſet on fire, and all that were in it periſhed in the flames.

11
The empire again divided.

Clotaire did not long ſurvive this cruel execution of his ſon, but died in 562; and after his death the French empire was divided among his four remaining ſons, Caribert, Gontran, Sigebert, and Chilperic.—The old king made no diviſion of his dominions before he died, which perhaps cauſed the young princes to fall out ſooner than they would otherwiſe have done. After his death, however, they divided the kingdom by lot; when Caribert, the eldeſt, had the kingom of Paris; Gontran, the ſecond, had Orleans; Sigebert had Metz (or the kingdom of Auſtraſia); and Chilperic had Soiſſons. Provence and Aquitaine were poſſeſſed by al of them in common. The peace of the empire was diſturbed in 563 by an invaſion of the Abares; a barbarous nation, ſaid to be the remains of the Hunns. They entered Thuringia, which belonged to the dominions of Sigebert: but by him they were totally defeated, and obliged to repaſs the Elbe with precipitation. Sigebert purſued them cloſe, but readily concluded a peace with them on their firſt propoſals. To this he was induced, by hearing that his brother Chilperic had invaded his dominions, and taken Rheims and ſome other places in the neighbourhood. Againſt him, therefore, Sigebert marched with his victorious army, made himſelf maſter of Soiſſons his capital, and of the perſon of his eldeſt ſon Theodobert. He then defeated Chilperic in battle; and not only recovered the place which he had ſeized, but conquered the greater part of his dominions: nevertheleſs, on the mediation of the other two brothers, Sigebert abandoned all his conqueſts, ſet Theodobert at liberty, and thus reſtored peace to the empire.

12
Infamous conduct of Chilperic.

Soon after this, Sigebert married Brunehaut daughter to Athanagilde king of the Viſigoths in Spain; and in a little time after the marriage, died Caribert king of Paris, whoſe dominions were divided among his three brethren. In 567 Chilperic married Galſwintha, Brunehaut's eldeſt ſiſter, whom he did not obtain without ſome difficulty. Before her arrival, he diſmiſſed his miſtreſs called *Fredegonde*; a woman of great abilities and firmneſs of mind, but ambitious to the higheſt degreee, and capable of committing the blackeſt crimes in order to gratify her ambition. The queen, who brought with her immenſe treaſures from Spain, and made it her whole ſtudy to pleaſe the king, was for ſome time entirely acceptable. By degrees, however, Chilperic ſuffered Fredegonde to appear again at court, and was ſuſpected of having renewed his intercourſe with her; which gave ſuch umbrage to the queen, that ſhe deſired leave to return to her own country, promiſing to leave behind her all the wealth ſhe had brought. The king, knowing that this would render him extremely odious, found means to diſſipate his wife's ſuſpicions, and ſoon after cauſed her to be privately ſtrangled, upon which he publicly married Fredegonde.

Such an attrocious action could not fail of exciting the greateſt indignation againſt Chilperic. His dominions

nions were immediately invaded by Sigebert and Gontran, who conquered the greateſt part of them; after which they ſuddenly made peace, Chilperic conſenting that Brunehaut ſhould enjoy thoſe places which on his marriage he had beſtowed upon Galſwintha, viz. Bourdeaux, Limoges, Cahors, Bigorre, and the town of Bearn, now called *Leſcar*.

The French princes, however, did not long continue at peace among themſelves. A war quickly enſued, in which Gontran and Chilperic allied themſelves againſt Sigebert. The latter prevailed; and having forced Gontran to a ſeparate peace, ſeemed determined to make Chilperic pay dear for his repeated perfidy and infamous conduct; when he was aſſaſſinated by a contrivance of Fredegonde, who thus ſaved herſelf and Chilperic from the moſt imminent danger. Immediately on his death, Brunehaut fell into the hands of Chilperic; but Gondebaud, one of Sigebert's beſt general's, made his eſcape into Auſtraſia with Childebert, the only ſon of Sigebert, an infant of about five years of age, who was immediately proclaimed king in room of his father. In a ſhort time, however, Meroveus, eldeſt ſon to Chilperic, fell in love with Brunehaut, and married her without acquainting his father. Chilperic, on this news, immediately went to Rouen, where Meroveus and his conſort were; and having ſeized them, ſent Brunehaut and her two daughters to Metz, and carried Meroveus to Soiſſons. Soon after, one of his generals being defeated by Gontran, who eſpouſed Brunehaut's cauſe, Chilperic, in a fit of rage, cauſed Meroveus to be ſhaved and confined in a monaſtery. From hence he found means to make his eſcape, and with great difficulty arrived in Auſtraſia, where Brunehaut would gladly have protected him: but the jealouſy of the nobles was ſo ſtrong, that he was forced to leave that country; and being betrayed into the hands of his father's forces, was murdered at the inſtigation of Fredegonde, as was generally believed.

13 Sigebert aſſaſſinated;

The French empire was at this time divided between Gontran king of Orleans, called alſo king of Burgundy, Chilperic king of Soiſſons, and Childebert king of Auſtraſia. Chilperic found his affairs in a very diſagreeable ſituation. In 579, he had a diſpute with Varoc count of Bretagne, who refuſed to do him homage. Chilperic diſpatched a body of troops againſt him; who were defeated, and he was then forced to ſubmit to a diſhonourable peace. His brother and nephew lived in ſtrict union, and had no reaſon to be very well pleaſed with him. His own ſubjects, being oppreſſed with heavy taxes, were miſerably poor and diſcontented. His ſon Clovis, by a former queen named *Andovera*, hated Fredegonde, and made no ſecret of his averſion. To add to this embarraſſment, the ſeaſons were for a long time ſo unfavourable, that the country was threatened with famine and peſtilence at the ſame time. The king and queen were both attacked by an epidemic diſeaſe which then raged. They recovered: but their three ſons, Clodobert, Samſon, and Dagobert, died; after which, the ſight of Clovis became ſo diſagreeable to Fredegonde, that ſhe cauſed him to be murdered, and likewiſe his mother Andovera, leſt Chilperic's affection for her ſhould return after the tragical death of her ſon.

14 And likewiſe Chilperic.

In 583 Chilperic himſelf was murdered by ſome unknown aſſaſſins, when his dominions were on the point of being conquered by Gontran and Childebert, who had entered into a league for that purpoſe. After his death Fredegonde implored the protection of Gontran for herſelf and her infant ſon Clotaire; which he very readily granted, and obliged Childebert to put an end to the war. He found himſelf, however, greatly diſficulted to keep Fredegonde and Brunehaut in awe; for theſe two princeſſes having been long rivals and implacable enemies, were continually ploting the deſtruction of each other. This, however, he accompliſhed, by favouring ſometimes Brunehaut and ſometimes Fredegonde; ſo that, during his life, neither of them durſt undertake any thing againſt the other.

15 Death of Gontran;

On the 28th of March 593, died Gontran, having lived upwards of 60, and reigned 32 years. Childebert ſucceeded to the kingdom without oppoſition, but did not long enjoy it; he himſelf died in the year 596, and his queen ſhortly after. His dominions were divided between his two ſons Theodobert and Thierri; the firſt of whom was declared king of Auſtraſia, and the later king of Burgundy. As Theodobert was only in the 11th year of his age, and Thierri in his 10th, Brunehaut governed both kingdoms with an abſolute ſway. Fredegonde, however, took care not to let ſlip ſuch a favourable opportunity as was offered her by the death of Childebert, and therefore made herſelf miſtreſs of Paris and ſome other places on the Seine. Upon this Brunehaut ſent againſt her the beſt part of the forces in Auſtraſia, who were totally defeated; but Fredegonde died before ſhe had time to improve her victory, leaving her ſon Clotaire heir to all her dominions.

16 And Fredegonde.

For ſome time Brunehaut preſerved her kingdom in peace; but in the end her own ambition proved her ruin. Inſtead of inſtructing Theodobert in what was neceſſary for a prince to know, ſhe took care rather to keep him in ignorance, and even ſuffered him to marry a young and handſome ſlave of his father's. The new queen was poſſeſſed of a great deal of affability and good-nature; by which means ſhe in a ſhort time gained the affection of her huſband ſo much, that he readily conſented to the baniſhment of Brunehaut. Upon this diſgrace ſhe fled to Thierri king of Burgundy, in the year 599. By him ſhe was very kindly received; and inſtead of exciting jealouſies or miſunderſtandings between the two brothers, ſhe engaged Thierri to attempt the recovery of Paris, and the other places which had been wreſted from their family by Fredegonde, procuring at the ſame time a conſiderable body of auxiliaries from the Viſigoths. This meaſure was ſo acceptable to Theodobert, that he likewiſe raiſed a numerous army, and invaded Clotaire's dominions in conjunction with his brother. A battle enſued, in which the forces of Clotaire were totally defeated, and himſelf ſoon after obliged to ſue for peace; which was not granted, but on condition of his yielding up the beſt part of his dominions.

17 Brunehaut baniſhed.

This treaty was concluded in the year 600; but three years afterwards, it was broken by Clotaire. He was again attacked by the two brothers, and the war carried on with great vigour till the next ſpring. At this time Thierri having forced Landri, Clotaire's general, to a battle, gave him a total overthrow, in which the king's infant ſon Merovæus, whom he had ſent along with Landri, was maſſacred; to gratify, as Clotaire pretended, the malice of Brunehaut. After this victory, Thierri marched directly to Paris; fully bent on the deſtruction of his couſin, which now ſeemed inevitable. This, however, was prevented by Theodobert; who no ſooner heard of the victory gained by Thierri, than he became jealous of his ſucceſs, and offerred Clotaire ſuch terms of peace as he gladly accepted. The latter having then nothing to fear on the ſide of Auſtraſia, quickly compelled Thierri to liſten to terms of accommodation alſo.

This behaviour of Theodobert greatly provoked his brother; and his reſentment was highly inflamed by Brunehaut, who never forgot her diſgrace in being baniſhed from his court. A war was therefore commenced between the two brothers in 605; but it was ſo highly diſapproved of by the nobility, that Thierri found himſelf obliged to put an end to it. The tranquillity which now took place was again diſturbed in 607, by Theodobert's ſending an embaſſy to demand ſome part of Childebert's dominions which had been added, by the will of that monarch, to thoſe of Burgundy. The nobility of both kingdoms were ſo much averſe to war, that they conſtrained their kings to conſent to a conference, attended by an equal number of troops; but Theodobert, by a ſcandalous breach of his faith, brought double the number, and compelled his brother to ſubmit to what terms he pleaſed. This piece of treachery inſtantly brought on a war; for Thierri was bent on revenge, and his nobility no longer oppoſed him. It was neceſſary, however, to ſecure Clotaire by a negociation; and accordingly a promiſe was made of reſtoring thoſe parts of his dominions which had formerly been taken from him, provided he would remain quiet. This treaty being finiſhed, Thierri entered Theodobert's dominions, defeated him in two battles, took him priſoner, uſed him with the utmoſt indignity; and having cauſed an infant ſon of his to be put to death, ſent him to his grandmother Brunehaut. By her orders he was firſt ſhaved and confined in a monaſtery; but afterwards, fearing leſt he ſhould make his eſcape, ſhe cauſed him to be put to death.—Clotaire, in the mean time, thought that the beſt method of making Thierri keep his word was to ſeize on thoſe places which he had promiſed to reſtore to him, before his return from the war with Theodobert. This he accordingly did; and Thierri no ſooner heard of his having done ſo, than he ſent him a meſſage requiring him to withdraw his forces, and, in caſe of his refuſal, declared war. Clotaire was prepared for this; and accordingly aſſembled all the forces in his dominions, in order to give him a proper reception. But before Thierri could reach his enemies, he was ſeized with a dyſentery; of which he died in the year 612, having lived 26 years, and reigned 17.

18
Death of Thierri.

On the death of Thierri, Brunehaut immediately cauſed his eldeſt ſon, named *Sigiſbert*, then in the 10th year of his age, to be proclaimed king. It is probable, that ſhe intended to have governed in his name with an abſolute ſway; but Clotaire did not give her time to diſcover her intentions. Having great intelligence in Auſtraſia and Burgundy, and knowing that the nobility in both kingdoms were diſaffected to Brunehaut, he declared war againſt her; and ſhe being betrayed by her generals, fell into the hands of her enemies. Clotaire gave her up to the nobles; who generally hated her, and who uſed her in the moſt cruel manner. After having led her about the camp, expoſed to the inſults of all who had the meanneſs to inſult her, ſhe was tied by the leg and arm to the tail of an untamed horſe, which, ſetting off at full ſpeed, quickly daſhed out her brains. After this her mangled body was reduced to aſhes, which were afterwards interred in the abbey of St Martin at Autun.

19
Brunehaut put to a cruel death.

Thus in the year 613, Clotaire became ſole monarch of France; and quietly enjoyed his kingdom till his death, which happened in 628. He was ſucceeded by Dagobert; who proved a great and powerful prince, and raiſed the kingdom of France to a high degree of ſplendor. Dagobert was ſucceeded by his ſons Sigebert and Clovis; the former of whom had the kingdom of Auſtraſia, and the latter that of Burgundy. Both the kings were minors at the time of their acceſſion to the throne, which gave an opportunity to the mayors of the palace (the higheſt officers under the crown) to uſurp the whole authority. Sigebert died in 640, after a ſhort reign of one year; leaving behind him an infant ſon named *Dagobert*, whom he ſtrongly recommended to the care of Grimoalde his mayor of the palace. The miniſter cauſed Dagobert to be immediately proclaimed king, but did not long ſuffer him to enjoy that honour. He had not the cruelty, however, to put him to death; but ſent him to a monaſtery in one of the Weſtern Iſlands of Scotland; and then, giving out that he was dead, advanced his own ſon Childebert to the throne. Childebert was expelled by Clovis king of Burgundy; who placed on the throne Childeric, the ſecond ſon of Sigebert. Clovis died ſoon after the revolution, and was ſucceeded in his dominions by his ſon Clotaire; who died in a ſhort time, without iſſue. He was ſucceeded by his brother Childeric; who, after a ſhort reign, was murdered with his queen, at that time big with child, and an infant ſon named *Dagobert*; though another, named *Daniel*, had the good luck to eſcape.

20
Miſerable ſituation of France.

The affairs of the French were now in the moſt deplorable ſituation. The princes of the Merovingian race had been for ſome time entirely deprived of their power by their officers called *mayors of the palace*. In Auſtraſia the adminiſtration had been totally engroſſed by Pepin and his ſon Grimaulde; while Archambaud and Ebroin did the ſame in Neuſtria and Burgundy. On the reunion of Neuſtria and Burgundy to the reſt of the French dominions, this miniſter ruled with ſuch a deſpotic ſway, that the nobility of Auſtraſia were provoked to a revolt; electing for their dukes two chiefs named *Martin* and *Pepin*. The forces of the confederates, however, were defeated by Ebroin; and Martin having ſurrendered on a promiſe of ſafety, was treacherouſly put to death. Pepin loſt no time in recruiting his ſhattered forces; but before he had any occaſion to try his fortune a ſecond time in the field of battle, the aſſaſſination of Ebroin delivered him from all apprehenſions from that quarter. After his death Pepin carried every thing before him, overthrew the royal army under the command of the new miniſter Bertaire; and, having got poſſeſſion of the capital, cauſed himſelf to be declared mayor of the palace; in which ſtation he continued to govern with an abſolute ſway during the remainder of his life.

Pepin (who had got the ſurname of *Heriſtal* from his

21
Exploits of Charles Martel.

his palace on the Meuſe) died in the year 714, having enjoyed unlimited power for 26 years. He appointed his grandſon Theudobalde, then only ſix years of age, to ſucceed him in his poſt of mayor of the palace. This happened during the reign of Dagobert already mentioned: but this prince had too much ſpirit to ſuffer himſelf to be deprived of his authority by an infant, the adherents of the young mayor were defeated in battle, and this defeat was ſoon followed by his death. Charles, however, the illegitimate ſon of Pepin, was now raiſed to the dignity of duke by the Auſtraſians, and by his great qualities ſeemed every way worthy of that honour. The murder of Dagobert freed him from a powerful opponent: and the young king Chilperic, who after Dagobert's death was brought from a cloyſter to the throne, could by no means cope with ſuch an experienced antagoniſt. On the 19th of March 717, Charles had the good fortune to ſurpriſe the royal camp as he paſſed through the foreſt of Arden; and ſoon after a battle enſued, in which the king's forces were entirely defeated. On this Chilperic entered into an alliance with Eudes duke of Aquitaine, whoſe friendſhip he purchaſed by the final ceſſion of all the country which Eudes had ſeized for himſelf. Charles, however, having placed on the throne another of the royal family named *Clotaire*, advanced againſt Chilperic and his aſſociate, whom he entirely defeated near Soiſſons. After this diſaſter Eudes, deſpairing of ſucceſs, delivered up Chilperic into the hands of his antagoniſt; after having ſtipulated for himſelf the ſame terms which had been formerly granted him by the captive monarch.

Charles now advanced to the ſummit of power, treated Chilperic with great reſpect; and, on the death of Clotaire cauſed him to be proclaimed king of Auſtraſia: by which, however, his own power was not in the leaſt diminiſhed: and from this time the authority of the kings of France became merely nominal; and ſo inactive and indolent were they accounted, that hiſtorians have beſtowed upon them the epithet of *faneans*, i. e. "lazy or idle." Charles, however, had ſtill one competitor to contend with. This was Rainfroy, who had been appointed mayor of the palace; and who made ſuch a vigorous reſiſtance, that Charles was obliged to allow him the peaceable poſſeſſion of the country of Anjou. No ſooner, however, had Charles thus ſet himſelf at liberty from domeſtic enemies, than he was threatened with deſtruction from foreign nations. The Suevians, Friſons, and Allemanni, were ſucceſſively encountered and defeated. Eudes alſo, who had perfidiouſly broken the treaties to which he had bound himſelf, was twice repulſed; after which Charles invaded Aquitain, and obliged the treacherous duke to hearken to reaſon. This was ſcarce accompliſhed when he found himſelf engaged with a more formidable enemy than any he had yet encountered. The Saracens, having over-run great part of Aſia, now turned their victorious arms weſtward, and threatened Europe with total ſubjection. Spain had already received the yoke; and having paſſed the Pyrenees, they next invaded France, appearing in vaſt numbers under the walls of Thouloufe. Here they were encountered and defeated by Eudes; but this proved only a partial check. The barbarians once more paſſing the Pyrenees, entered France with ſuch a powerful army, that Eudes was no longer able to reſiſt. He encountered them indeed with his accuſtomed valour; but being forced to yield to ſuperior power, he ſolicited the protection and aſſiſtance of Charles. On this occaſion the latter, on account of his valour and perſonal ſtrength, acquired the name of *Martel*, i. e. "the hammer," alluding to the violence of the ſtrokes he beſtowed on his enemies*. Three hundred and ſeventy-five thouſand of the Infidels, among whom was the commander Abderahman himſelf, are ſaid to have periſhed in the battle; notwithſtanding which they ſoon made another irruption: but in this they were attended with no better ſucceſs, being again defeated by Charles; who by ſo many victories eſtabliſhed his power on the moſt ſolid foundation. Having again defeated the Friſons, and with his own hand killed their duke, he aſſumed the ſovereignty of the dominions of Eudes after his deceaſe, reſerving to himſelf the claim of homage, which he ought to have yielded to Thierri his lawful ſovereign. At laſt his fame grew ſo great that he was choſen by pope Gregory III. for his protector. He offered to ſhake off the yoke of the Greek emperor, and to inveſt Charles with the dignity of Roman conſul: ſending him at the ſame time the keys of the tomb of St Peter; but while this negociation was going on ſucceſsfully, the pope, the emperor, and Charles Martel himſelf died. After his death, which happened in the year 741, his dominions were divided among his three ſons, Carloman, Pepin, and Grippon, according to the diſpoſition he had made in his life-time. By this Carloman, the eldeſt, had Auſtraſia; Pepin, the ſecond, Neuſtria and Burgundy; while Grippon, the third, had only ſome lands aſſigned him in France; by which he was ſo much diſpleaſed, that the tranquillity of the empire was ſoon diſturbed. With the aſſiſtance of his mother Sonnechilde he ſeized on the city of Laon, where he endured a violent ſiege. In the end, however, he was obliged to ſubmit; Sonnechilde was put into a monaſtery, and Grippon impriſoned in a caſtle at Arden. The two brothers, having thus freed themſelves from their domeſtic enemy, continued to govern the empire with uninterrupted harmony; but their tranquillity was ſoon diſturbed by the intrigues of Sonnechilde. That enterpriſing and ambitious woman had negociated a marriage between Odilon duke of Bavaria and Hiltrude the ſiſter of the two princes. This was no ſooner accompliſhed than Odilon, inſtigated by Sonnechilde, and alarmed at the growing power of the two princes, entered into an alliance with Theodobald duke of the Allemani and Theodoric duke of the Saxons; who having aſſembled a formidable army, advanced directly againſt the princes. They poſted themſelves in an advantageous manner, with the river Lech in their front; but Carloman and Pepin, paſſing the river at different fords in the night-time, attacked the camp of the allies with great vigour. The engagement continued doubtful for five hours: but at laſt the entrenchments were forced on all ſides, the Bavarians and Saxons entirely routed, and the vanquiſhed dukes obliged to ſubmit to the clemency of the victors. During their abſence on this expedition, Hunalde, whom Charles Martel had appointed duke of Aquitain, having likewiſe entered into a confederacy with Odilon paſſed the Loire, ravaged the open country, and burnt the magnificent cathedral of the city of Chartres. The two princes, however, having returned with their victorious

22
France divided among ſons o Charles.

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* See *Arabia*, n° 174.

torious army, Hunalde found himſelf obliged to retreat: and even this availed him but little; for the Franks entering the dutchy of Aquitain, committed ſuch devaſtations, that Hunalde in deſpair reſigned his dominions to his ſon, and retired into a convent. This event was ſoon followed by a ſimilar reſignation of Carloman, notwithſtanding the uninterrupted ſucceſs he had met with. He ſuddenly took the reſolution of retiring into a convent, and perſiſted in his deſign, notwithſtanding the intreaties of Pepin, who, to appearance at leaſt, did all he could to diſſuade him.

23
Pepin becomes ſole maſter of the kingdom.

By the reſignation of Carloman, which happened in the year 736, Pepin was left ſole maſter of France; and in this exalted ſtation he acquitted himſelf in ſuch a manner as has juſtly rendered his name famous to poſterity. One of the firſt acts of his new adminiſtration was to releaſe his brother Grippon from priſon: but that treacherous prince had no ſooner regained his liberty, than he again excited the Saxons to take up arms. His enterpriſe, however, proved unſucceſsful; the Saxons were defeated, their duke Theodoric taken, and his ſubjects obliged to ſubmit to the will of the conqueror; who upon this occaſion cauſed them make a profeſſion of the Chriſtian religion. Grippon then fled to Hiltrude, his half-ſiſter, whoſe huſband Odilon was now dead, and had left an infant ſon named *Taſſilon.* He met with a favourable reception from her; but, with his uſual treacheary, ſeized both her and her ſon by the aſſiſtance of an army of malcontent Franks, whom he had perſuaded to join him. His next ſtep was to aſſume the ſovereignty and title of duke of Bavaria; but being driven from the throne by Pepin, he was obliged to implore his clemency, which was once more granted. All theſe misfortunes, however, were not yet ſufficient to cure Grippon of his turbulence and ambition: He once more endeavoured to excite diſturbance in the court of Pepin; but being finally detected and baffled, he was obliged to take refuge in Aquitain.

24
Aſſumes the title of king.

Pepin having now ſubdued all his foes both foreign and domeſtic, began to think of aſſuming the title of *king*, after having ſo long enjoyed the regal power. His wiſhes in this reſpect were quite agreeable to thoſe of the nation in general. The nobility, however, were bound by an oath of allegiance to Childeric the nominal monarch at that time; and this oath could not be diſpenſed with but by the authority of the pope. Ambaſſadors for this purpoſe were therefore diſpatched both from Pepin and the nobility to pope Zachary, the reigning pontiff. His holineſs replied, that it was lawful to transfer the regal dignity from hands incapable of maintaining it to thoſe who had ſo ſucceſsfully preſerved it; and that the nation might unite in the ſame perſon the authority and title of *king*. On this the unfortunate Childeric was degraded from his dignity, ſhaved, and confined in a monaſtery for life; Pepin aſſumed the title of *king of France*, and the line of Clovis was finally ſet aſide.

This revolution took place in the year 751. The attention of the new monarch was firſt claimed by a revolt of the Saxons; but they were ſoon reduced to ſubjection and obliged to pay an additional tribute: and during his expedition againſt them, the king had the ſatisfaction of getting rid of his reſtleſs and treacherous competitor Grippon. This turbulent prince, having ſoon become weary of reſiding at the court of Aquitain, determined to eſcape from thence, and put himſelf under the protection of Aſtolphus king of the Lombards; but he was killed on attempting to force a paſs on the confines of Italy. Pepin in the mean time continued to puſh his good fortune. The ſubmiſſion of the Saxons was ſoon followed by the reduction of Brittany; and that by the recovery of Narbonne from the infidels. His next exploit was the protection of pope Stephen third, againſt Aſtolphus the king of the Lombards, who had ſeized on the exarchate of Ravenna, and inſiſted on being acknowledged king of Rome. The pope, unable to contend with ſuch a powerful rival, haſted to croſs the Alps and implore the protection of Pepin, who received him with all the reſpect due to his character. He was lodged in the abbey of St Dennis, and attended by the king in perſon during a dangerous ſickneſs with which he was ſeized. On his recovery Stephen ſolemnly placed the diadem on the head of his benefactor, beſtowed the regal unction on his ſons Charles and Carloman, and conferred on the three princes the title of *patricians of Rome*. In return for theſe honours Pepin accompanied the pontiff into Italy at the head of a powerful army. Aſtolphus, unable to withſtand ſuch a powerful antagoniſt, ſhut himſelf up in Pavia, where he was cloſely beſieged by the Franks, and obliged to renounce all pretenſions to the ſovereignty of Rome, as well as to reſtore the city and exarchate of Ravenna, and ſwear to the obſervance of the treaty. No ſooner was Pepin gone, however, than Aſtolphus broke the treaty he had juſt ratified with ſuch ſolemnity. The pope was again reduced to diſtreſs, and again applied to Pepin. He now ſent him a pompous epiſtle in the ſtyle and character of St Peter himſelf; which ſo much inflamed the zeal of Pepin, that he inſtantly ſet out for Italy, and compelled Aſtolphus a ſecond time to ſubmit to his terms: which were now rendered more ſevere by the impoſition of an annual tribute. Pepin next made a tour to Rome; but finding that his preſence there gave great uneaſineſs both to the Greeks and to the pope himſelf, he thought proper to finiſh his viſit in a ſhort time. Soon after his return Aſtolphus died, and his dominions were uſurped by his general Didier; who however, obtained the papal ſanction for what he had done, and was recogniſed as lawful ſovereign of the Lombards in the year 756.

Pepin returned to France in triumph; but the peace of his dominions was ſoon diſturbed by the revolt of the Saxons, who always bore the French yoke with the utmoſt impatience. Their preſent attempts, however, proved equally unſucceſsful with thoſe they had formerly made; being obliged to ſubmit and purchaſe their pardon not only by a renewal of their tribute, but by an additional ſupply of 300 horſe. But while the king was abſent on this expedition, Vaiſar duke of Aquitain took the opportunity of ravaging Burgundy, where he carried his devaſtations as far as Chalons. Pepin ſoon returned, and entering the dominions of Vaiſar, committed ſimilar devaſtations, and would probably have reduced the whole territory of Aquitain, had he not been interrupted by the hoſtile preparations of his nephew Taſſilon the duke of Bavaria. The king, however, contented himſelf at preſent with ſecuring his frontiers by a chain of poſts, againſt any invaſion : after which he reſumed his enterpriſe on the dominions of Vaiſar. The latter at firſt attempted to impede the progreſs of his antagoniſt by burning and laying waſte the country ; but finding this to no purpoſe, he determined to try his fortune in an engagement. Victory declared in favour of Pepin ; but he refuſed to grant a peace upon any terms. The French monarch advanced to the banks of the Garonne ; while Vaiſer was abandoned by his ally the duke of Bavaria, and even by his own ſubjects. In this diſtreſs he retired with a band of faithful followers into the country of Saintonge, where he defended himſelf as long as poſſible, but was at laſt deprived both of his crown and life by the victor.

25
Death of Pepin.

Thus the duchy of Aquitain was once more annexed to the crown of France ; but Pepin had ſcarce time to indulge himſelf with a view of his new conqueſt when he was ſeized with a ſlow fever, which put an end to his life in the year 768, the 54th of his age, and 17th of his reign. He was of a ſhort ſtature, whence he had the ſurname of *Le Bref*, or *the Short* ; but his great actions juſtly intitled him to the character of an hero ; though under the ſucceeding reign his own fame ſeemed to have been entirely forgot, and on his tomb was only inſcribed, “ Here lies the father of Charlemagne.”

26
Succeeded by his two ſons.

Pepin was ſucceeded in his authority by his two ſons Charles and Carloman ; to whom with his dying breath he bequeathed his dominions. They continued to reign jointly for ſome time ; but the active and enterpriſing ſpirit of Charles gave ſuch umbrage to the weak and jealous Carloman, that he regarded him with envy, and was on the point of coming to an open rupture with him, when he himſelf was taken off by death, and thus the tranquillity of the empire was preſerved.

The firſt military enterpriſe of Charles was againſt Hunalde, the old duke of Aquitain ; who leaving the monaſtery where he had reſided upwards of 20 years, aſſumed the royal title, and was joyfully received by his ſubjects, already weary of the French yoke. Charles took the field with the utmoſt expedition, and with difficulty prevailed upon his brother Carloman, who was then alive, to join him with his forces. But the junction was ſcarce effected, when Carloman withdrew his forces again, and left his brother to carry on the war in the beſt manner he could. Charles, though thus deſerted, did not heſitate at engaging the enemy ; and having overthrown them in a great battle, Hunalde was obliged to fly to the territories of Lupus duke of Gaſcony. Charles quickly ſent an embaſſy demanding the fugitive prince ; and Lupus, not daring to diſobey the orders of ſuch a powerful monarch, yielded up the unfortunate Hunalde, who was inſtantly caſt into priſon, from which, however, he afterwards made his eſcape.

27
Reign of Charles the Great.

The death of Carloman, which happened in the year 771, left Charles ſole maſter of France ; but the revolt of the Saxons involved him in a ſeries of wars from which he did not extricate himſelf for 33 years. Theſe had long been tributaries to the French, but frequently revolted : and now, when freed from the terror of Pepin's arms, thought they had a right to ſhake off the yoke altogether. Charles entered their country with a powerful army ; and having defeated them in a number of ſmall engagements, advanced towards Ereſbourg near Paderborn, where they had their capital poſt, and where was the image of their god Irminſul, repreſented as a man completely armed, and ſtanding on a column. The Saxons made an obſtinate defence, but were at laſt obliged to ſubmit ; and Charles employed his army three days in demoliſhing the monuments of idolatry in this place ; which ſo much diſheartened the whole nation, that for the preſent they ſubmitted to ſuch terms as he pleaſed to impoſe ; and which were rendered eaſier than they probably would have been, by the news which Charles now received from Italy. He had concluded a marriage with the daughter of Didier king of the Lombards ; but this had been diſſolved by the Pope, who reproached the Lombards with the firſt ſtain of the leproſy. Thus all friendſhip was diſſolved betwixt Didier and Charles ; and as the Lombard monarchs ſeem to have had a kind of natural enmity towards the popes, it is not ſurpriſing that it ſhould now break out with uncommon fury. Didier having ſeized and frighted to death Pope Stephen IV. uſed his utmoſt endeavours to reduce his ſucceſſor Adrian I. to a ſtate of entire dependance on himſelf. Adrian applied to the French monarch, the uſual reſource of the pontiffs in thoſe days. Charles was very willing to grant the neceſſary aſſiſtance, but the nobility were averſe to an Italian war : ſo that he was obliged to act with great circumſpection. Several embaſſies were therefore ſent to Didier, entreating him to reſtore to the pope thoſe places which he had taken from him, and at laſt even offering him a large ſum of money if he would do ſo ; but this propoſal being rejected, he obtained the conſent of his nobility to make war on the Lombards. Didier diſpoſed his troops in ſuch a manner, that the officers of Charles are ſaid to have been unanimouſly of opinion that it would be impoſſible to force a paſſage. This, however, was accompliſhed, either through the ſuperior ſkill of Charles, according to ſome hiſtorians, or a panic which ſeized the Lombard ſoldiers, according to others ; after which, Didier, with the old duke of Aquitain, who had eſcaped from his priſon, and taken refuge at his court, ſhut themſelves up in Pavia. Adalgiſe, the only ſon of the Lombard monarch, with the widow and children of Carloman, fled to Verona. That city was immediately inveſted by the conqueror, and in a ſhort time obliged to ſubmit. Adalgiſe had the good luck to eſcape to Conſtantinople, but we are not informed what became of Carloman's widow and children. Charles, after paying a ſhort viſit to Rome, returned to the ſiege of Pavia. The place was vigorouſly defended, until famine and peſtilence obliged the inhabitants to implore the clemency of Charles. Hunalde fell a ſacrifice to his own obſtinacy in oppoſing the intention of the people ; Didier was taken priſoner and carried into France ; but we are not informed of his fate afterwards. His kingdom, however, was totally diſſolved, and Charles was crowned kind of Lombardy at Milan in the year 774.

Having received the oaths of allegiance from his new ſubjects, Charles ſet out for Saxony, the inhabitants of which had again revolted, and recovered Ereſbourg their capital. The king ſoon recovered this important poſt ; but a detachment of his army being cut off, and new troubles ariſing in Italy, he was obliged

ged to accept of the propoſals of the Saxons, though their ſincerity was very doubtful. Having therefore only ſtrengthed the fortifications of Ereſbourg, and left a ſufficient garriſon in the place, he ſet out for Italy, which was all in commotion through the intrigues of the emperor of the Eaſt, and Adalgiſe the ſon of Didier. The preſence of Charles reſtored tranquillity in that quarter; but in the mean time, the Saxons having taken Ereſbourg and deſtroyed the fortifications, threatened to annihilate the French power in that quarter. On the king's return, he found them employed in the ſiege of Sigebourg. His ſudden arrival ſtruck the barbarians with ſuch terror, that they inſtantly ſued for peace; which the king once more granted, but took care to ſecure their obedience by a chain of forts along the river Lippe, and repairing the fortifications of Ereſbourg. An aſſembly of the Saxon chiefs was held at Paderborn; and a promiſe was made, that the nation ſhould embrace the Chriſtian religion: after which the king ſet out on an expedition to Spain in the year 778.

This new enterpriſe was undertaken at the requeſt of Ibunala, the Mooriſh ſovereign of Saragoſſa, who had been driven from his territory. He was reſtored, however, by the prowеſs of Charles, who reduced the cities of Pampluna and Saragoſſa. He reduced alſo the city of Barcelona, and the kingdoms of Navarre and Arragon; but on his return, he met with a ſevere check from the Gaſcons, who attacked and defeated the rear-guard of his army with great ſlaughter as they paſſed the Pyrenean mountains. This engagement, which ſeems to imply ſome defect in the prudence or military ſkill of Charles, has been much celebrated among romance writers, on account of the death of Roland a famous warrior.

Next year, 779, he paid a viſit to Italy with his two ſons Carloman and Louis. Having paſſed the winter at Pavia, he entered Rome next ſpring amidſt the acclamations of the inhabitants. Here, in the 39th year of his age, he divided his dominions in preſence of the pope betwixt his two ſons Carloman and Louis. The former, who now took the name of Pepin, had Lombardy; the latter Aquitain. Having then received the ſubmiſſion of Taſſilon duke of Bavaria, he ſet out for Saxony, where he took a moſt ſevere revenge on the people of that country for the many treacheries they had been guilty of. The preſent revolt was chiefly owing to a chief named Witikind, who had twice before fled from the victorious arms of Charles, and taken refuge at the court of Denmark. Returning from thence in the king's abſence, he rouſed his countrymen to action, while the generals of Charles, diſagreeing among themſelves, neglected to take the proper methods for repelling the enemy. In conſequence of this, they were entirely defeated on the banks of the Weſer in the year 782. Charles arrived in time to prevent the total deſtruction of his people, and directly penetrated into the heart of the country. Witikind, unable to reſiſt his antagoniſt, once more fled into Denmark; but 4500 of his followers periſhed at once by the hands of the executioner. An univerſal inſurrection was the conſequence of this unheard of cruelty; and though during three years the French monarch was conſtantly ſucceſsful in the field, he found it impoſſible by any force whatever to ſubdue the ſpirit of the people. At laſt therefore he was obliged to have recourſe to negociation. Witikind and ſeveral other chiefs were invited to an interview; where Charles repreſented to them in ſuch ſtrong colours the ruin which muſt neceſſarily enſue to their country by perſiſting obſtinately in oppoſition to him, that they were induced not only to perſuade their countrymen finally to ſubmit, but to embrace the Chriſtian religion.

Charles having thus brought his affairs in Saxony to an happy concluſion turned his arms againſt Taſſilon duke of Bavaria, who had underhand ſupported the Saxons in their revolt. Having entered his country with a powerful army in the year 787, he made ſuch rapid advances, that the total deſtruction of Taſſilon ſeemed inevitable. Charles had advanced as far as the river Lech, when Taſſilon privately entered his camp, and threw himſelf at his feet. The king had compaſſion on his faithleſs kinſman on ſeeing him in this abject poſture; but no ſooner did the traitor find himſelf at liberty than he ſtirred up the Hunns, the Greek emperor, and the fugutive Adalgiſe, againſt the king. He fomented alſo the diſcontents of the factious nobles of Aquitain and Lombardy; but his ſubjects, fearing leaſt theſe intrigues ſhould involve them in deſtruction, made a diſcovery of the whole to Charles. Taſſilon, ignorant of this, entered the diet at Ingelheim, not ſuſpecting any danger, but was inſtantly arreſted by order of the French monarch. Being brought to a trial, the proofs of his Guilt were ſo apparent, that he was condemned to loſe his head: the puniſhment, however, was afterwards mitigated to perpetual confinement in a monaſtery, and the duchy of Bavaria was annexed to the dominions of Charles.

The Hunns and other enemies of the French monarch continued to proſecute their enterpriſes without regarding the fate of their aſſociate Taſſilon. Their attempts, however, only ſerved to enhance the fame of Charles. He defeated the Hunns in Bavaria, and the Greek emperor in Italy; obliging the latter to renounce for ever the fortune of Adalgiſe. The Hunns, not diſheartened by their defeat, continuing to infeſt the French dominions, Charles entered their country at the head of a formidable army; and having forced their entrenchments, penetrated as far as Raal on the Danube, but was compelled by an epidemic diſtemper to retire before he had finiſhed his conqueſt. He was no ſooner returned to his own dominions, than he had the mortification to be informed, that his eldeſt ſon Pepin had conſpired againſt his ſovereignty and life. The plot was diſcovered by a prieſt who had accidentally fallen aſleep in a church where the conſpirators were aſſembled. Being awakened by their voices, he overheard them conſulting on the proper meaſures for completing their purpoſe; on which he inſtantly ſet out for the palace, and ſummoned the monarch from his bed to inform him of the guilt of his ſon. Pepin was ſeized, but had his life ſpared, tho' condemned to expiate his offences by ſpending the remainder of his days in a monaſtery.

Charles was no ſooner freed from this danger than he was again called to arms by a revolt of the Saxons on the one hand, while a formidable invaſion of the Moors diſtreſſed him on the other; the Hunns at the ſame time renewing their depredations on his dominions,

nions. The king did not at preſent make war againſt the Moors; probably foreſeeing that they would be called off by their Chriſtian enemies in Spain. This accordingly happened; the victories of Alonſo the Chaſte obliged them to leave France; after which Charles marched in perſon to attack the Saxons and Hunns. The former conſented again to receive the Chriſtan religion, but were likewiſe obliged to deliver up a third part of their army to be diſpoſed of at the king's pleaſure; but the Hunns defended themſelves with incredible vigour. Though often defeated, their love of liberty was altogether invincible; ſo that the war was not terminated but by the death of the king, and an almoſt total deſtruction of the people: only one tribe could be induced to acknowledge the authority of the French monarch.

Theſe exploits were finiſhed betwixt the years 793 and 798; after which Charles invaded and ſubdued the iſlands of Majorca and Minorca; which the diſſenſions of the Mooriſh chiefs gave him an opportunity of doing. The ſatisfaction he felt from his new conqueſt, however, was ſoon damped by the troubles which broke out in Italy. After the death of pope Adrian, his nephew aſpired to the papal dignity; but a prieſt named Leo being preferred, the diſappointed candidate determined on revenge. He managed matters ſo well, that his deſigns were concealed for four years. At laſt, on the day of a proceſſion, a furious aſſault was made on the perſon of Leo. The unfortunate pontiff was left for dead on the ground; but having with difficulty recovered, and made his eſcape to the Vatican, he was protected by the duke of Spoleto, at that time general of the French forces. His cauſe was warmly eſpouſed by Charles, who invited him to his camp at Paderborn in Weſtphalia; whence he diſpatched him with a numerous guard to Rome, promiſing ſoon after to viſit that metropolis, and redreſs all grievances. His attention for the preſent, however, was called by the deſcents of the Normans on the maritime provinces of his dominions; ſo that he was obliged to defer the promiſed aſſiſtance for ſome time longer. Having conſtructed forts at the mouths of moſt of the navigable rivers, and further provided for the defence of his territories, by inſtituting a regular militia, and appointing proper ſquadrons to cruiſe againſt the invaders, he ſet out for the fourth and laſt time on a journey to Rome. Here he was received with the higheſt poſſible honours. Leo was allowed to clear himſelf by oath of the crimes laid to his charge by his enemies, while his accuſers were ſent into exile. On the feſtival of Chriſtmas, in the year 800, after Charles had made his appearence in the cathedral of St Peter, and aſſiſted devoutly at maſs, the pope ſuddenly put a crown on his head; and the place inſtantly reſounded with acclamations of "Long life to Charles the Auguſt, crowned by the hand of GOD! Long life and victory to the great and pacific emperor of the Romans!" His body was then conſecrated and anointed with royal unction; and after being conducted to a throne, he was treated with all the reſpect uſually paid to the ancient Cæſars; from this time alſo being honoured with the title of *Charlemagne*, or *Charles the Great*. In private converſation, however, he uſually proteſted, that he was ignorant of the pope's intention at this time; and that, had he known it, he would have diſappointed him by his abſence: but theſe proteſtations were not generally believed; and the care he took to have his new title acknowledged by the eaſtern emperors, evidently ſhowed how fond he was of it.

28
He is crowned emperor of the weſt.

Charles, now raiſed to the ſupreme dignity in the weſt, propoſed to unite in himſelf the whole power of the firſt Roman emperors, by marrying Irene the empreſs of the eaſt. But in this he was diſappointed by the marriage of that princeſs by Nicephorus: however, the latter acknowledged his new dignity of Auguſtus, and the boundaries of the two empires were amicably ſettled. Charles was further gratified by the reſpect paid him by the great Haroun Al-Raſhid, caliph of the Saracens, who yielded to him the ſacred city of Jeruſalem, and holy ſepulchre there. But in the mean time his empire was threatened with the invaſion of a very formidable enemy, whom even the power of Charles would have found it hard to reſiſt. Theſe were the Normans, at this time under the government of Godfrey a celebrated warrior, and who by their adventurous ſpirit, and ſkill in maritime affairs, threatened all the weſtern coaſts of Europe with deſolation. From motives of mutual convenience a tranſitory peace was eſtabliſhed, and Charles made uſe this interval to ſettle the final diſtribution of his dominions. Aquitain and Gaſcony, with the Spaniſh march, were aſſigned to his ſon Louis; Pepin had Italy confirmed to him; and to this was added the greateſt part of Bavaria, with the country now poſſeſſed by the Griſons. Charles the eldeſt had Neuſtria, Auſtraſia, and Thuringia. The donation was ſuppoſed to be rendered more authentic by the ſanction of the pope. This diviſion, however, had ſcarce taken place, when the princes were all obliged to defend their dominions by force of arms. Louis and Pepin were attacked by the Saracens, and Charles by the Sclavonians. All theſe enemies were defeated; but while Charles hoped to ſpend the ſhort remainder of his life in tranquillity, he was once more called forth to martial exertions by the hoſtile behaviour of Godfrey the Norman leader. Charles ſent him a meſſage of defiance, which was returned in the ſame ſtyle by Godfrey: but the former, by artfully fomenting diviſions among the northern powers, prevented for a while the threatened danger; but, theſe diſturbances being quelled, the Normans renewed their depredations, and Charles was obliged to face them in the field. An engagement, however, was prevented by the death of Godfrey, who was aſſaſſinated by a private ſoldier; on which the Norman army retreated, and the dominions of the emperor ſtill remained free from theſe invaders. Still the latter days of Charles were embittered by domeſtic misfortunes. His favourite daughter Rotrude died, as did alſo Pepin king of Italy; and theſe misfortunes were ſoon followed by the death of his eldeſt ſon Charles. The emperor then thought proper to aſſociate his only ſurviving ſon Louis with him in the government; which was formally done at Aix-la-Chapelle. Charles himſelf ſurvived this tranſaction only a few months: his death happened on the 27th of January 814; in the 71ſt year of his age, and 47th of his reign.

29
Death of Charles the Great.

30
Extent of his territories.

By the martial atchievements of this hero, the French monarchy was raiſed to its utmoſt pitch of ſplendor. He had added the province of Aquitain to the territories of his anceſtors; he had confined the inhabitants of Brittany to the ſhores of the ocean, and obliged them to ſubmit to a diſgraceful tribute. He had reduced under his dominion all that part of Spain which extends from the Pyrenees to the river Ebro, and includes the kingdoms of Rouſillon, Navarre, Arragon, and Catalonia. He poſſeſſed Italy from the Alps to the borders of Calabria; but the duchy of Beneventum, including moſt of the preſent kingdom of Naples, eſcaped the yoke after a tranſitory ſubmiſſion. Beſides theſe extenſive countries, Charles added to his territories the whole of Germany and Pannonia; ſo that the French now had the juriſdiction of all the country from eaſt to weſt, from the Ebro in Spain to the Viſtula; and from north to ſouth, from the duchy of Beneventum to the river Eyder, the boundary between Germany and the dominions of Denmark. In acquiring theſe extenſive dominions Charles had been guilty of horrid and repeated maſſacres; for which, however, he had been in ſome meaſure excuſable by the barbarity and rebellious diſpoſition of the people with whom he had to deal, upon whom no mild meaſures would probably have had any effect. His eſtabliſhing of ſchools throughout the conquered provinces, ſhewed alſo his inclination to govern his ſubjects in peace, and to take proper ſteps for their civilization; though indeed many parts of his private conduct ſhowed no ſmall inclination to cruelty; particularly the fate of the ſons of Carloman, of whom no account could ever be obtained. His advice to his ſon Louis indeed was excellent; exhorting him to conſider his people as his children; to be very mild and gentle in his adminiſtration, but firm in the execution of juſtice; to reward merit; promote his nobles gradually; chooſe miniſters deliberately, but not remove them capriciouſly or without ſufficient reaſon. All theſe prudent maxims, however, were not ſufficient to enable Louis to govern dominions ſo extenſive, and people ſo turbulent as he had to deal with. At the time of the deceaſe of his father, this prince was about 36 years of age, and had married Ermengarde, daughter of the count of Heſbai of the dioceſe of Liege, by whom he had three ſons, Lothaire, Pepin, and Louis. Lothaire, the eldeſt, was aſſociated with himſelf in the empire, and the two youngeſt were entruſted with the governments of Aquitain and Bavaria. Every one of the princes proved unfaithful to their father, as well as enemies to one another. The death of Ermengarde, and the marriage of the emperor with Judith a princeſs of Bavaria, artful but accompliſhed, proved the firſt ſource of calamity to the empire. In the year 823, Charles, the emperor's youngeſt ſon was born: and his pretenſions became in time more fatal to the public tranquillity than the ambition and diſobedience of all the reſt. Various parts of the Imperial dominions were likewiſe aſſaulted by foreign enemies. The inhabitants of Brittany and Navarre revolted; the Moors invaded Catalonia; while the ambition of Judith produced a war amongſt the brothers themſelves.

31
Decline of his empire.

32
Civil wars among the ſons of Louis the Gentle.

Charles at firſt had been appointed ſovereign of that part of Germany bounded by the rivers Danube, the Maine, the Neckar, and the Rhine; the country of the Griſons and Burgundy, comprehending Geneva and the Swiſs Cantons: but this was oppoſed by the three elder ſons. Pepin and Louis advanced with the united forces of Aquitain and Bavaria, while the Imperial forces deſerted their ſtandard and joined the malcontents. The emperor was taken priſoner, and the empreſs retired to a monaſtery. Lothaire, the eldeſt of the young princes, to whom the reſt found themſelves obliged to ſubmit, was the perſon who retained the emperor in his poſſeſſion; but, notwithſtanding his breach of duty, his heart was touched with remorſe on account of the crimes he had committed. Dreading the reproach of the world at large, and being threatened with the cenſures of the church, he threw himſelf at his father's feet, and begged pardon for his guilt, conſenting to relinquiſh the authority he had unjuſtly uſurped. Thus Louis was reeſtabliſhed in his authority by the diet of the empire which had met to depoſe him. His firſt ſtep was to recal his empreſs from the monaſtery to which ſhe had retired; but this princeſs, implacable in her reſentment, now perſecuted Lothaire to ſuch a degree, that he was obliged to join his two brothers Pepin and Louis in a confederacy againſt their father. The old emperor thought to check this rebellious diſpoſition by revoking his grant of Aquitain to Pepin, and conferring it on his youngeſt ſon Charles, then only nine years of age; but pope Gregory IV. conferred the Imperial dignity itſelf on Lothaire, depoſing the unhappy monarch, and again ſending the empreſs to a nunnery in the foreſt of Arden. The unnatural behaviour of his ſons, however, once more excited the compaſſion of his ſubjects. Dreux, the biſhop of Mentz, uſed his intereſt with Louis king of Bavaria to arm his ſubjects in defence of his father and ſovereign. In this enterpriſe the Bavarian monarch was joined by the French and Saxons; ſo that the aged emperor was once more reſtored, the empreſs releaſed from her nunnery, and Charles from his priſon, in the year 833.

The ambition of Judith now ſet matters once more in a flame. Taking advantage of the affection her huſband bore her, ſhe perſuaded him to inveſt her ſon Charles with the ſovereignty of Neuſtria as well as the dominions formerly aſſigned him. This was productive of great diſcontents on the part of Lothaire and Pepin; but their power was now too much broken to be able to accompliſh any thing by force of arms. The death of Pepin, which happened ſoon after, produced a new diviſion of the empire. The claims of young Pepin and Charles, ſons of the deceaſed prince, were entirely diſregarded, and his French dominions divided between the two brothers Charles and Lothaire, the latter being named guardian to his infant nephew. This enraged Louis of Bavaria, whoſe intereſt was entirely neglected in the partition, to ſuch a degree, that he again revolted; but the unexpected appearance, with the hoſtile preparations of the Saxons, obliged him to ſubmit and aſk pardon for his offences. Still, however, the ambition of the empreſs kept matters in a continual ferment, and the empire was again threatened with all the calamities of civil war; but before theſe took place, the emperor died, in 831, after a moſt unfortunate reign of 27 years.

Louis was eminent for the mildneſs of his manners and peaceful virtues, which procured him the title of *Le Debonnaire*, or "the gentle;" but ſuch was the turbulence and exceſſive barbarity of the age in which he lived, that all his virtues, inſtead of procuring him reſpect and eſteem, were productive only of contempt and rebellion from thoſe whom both duty and nature ought to have rendered the moſt ſubmiſſive and obedient.

The deceaſe of the emperor was followed by a civil war among his ſons. The united forces of Lothaire and his nephew Pepin were defeated by thoſe of Charles and Louis in a very bloody battle in the plains of Fontenoy, where 100,000 Franks periſhed, in the year 842. This victory, however, bloody as it was, did not decide the fortune of the war. The conquerors having through motives of intereſt or jealouſy, retired each into their own dominions, Lothaire found means not only to recruit his ſhattered forces, but preſſed the other two princes ſo vigorouſly, that they were glad to conſent to a new partition of the empire. By this Lothaire was allowed to poſſeſs the whole of Italy, with the whole tract of country between the rivers Rhone and Rhine, as well as that between the Meuſe and Scheldt. Charles had Aquitain with the country lying between the Loire and the Meuſe; while Louis had Bavaria with the reſt of Germany, from whence he was diſtinguiſhed by the appellation of *Louis the German*.

33
Diviſion of the empire.

34
Lothaire reſigns,

35
Reign of Charles the Bald.

By this partition, Germany and France were disjoined in ſuch a manner as never afterwards to be united under one head. That part of France which was allowed to Lothaire, was from him called *Lotharingia*, and now *Lorrain*, by a gradual corruption of the word. The ſovereignty, however, which that prince had purſued at the expence of every filial duty, and purchaſed at ſo much blood, afforded him now but little ſatisfaction. Diſguſted with the cares and anxieties of his ſituation, he ſought relief in a monaſtery in the year 855. On his retreat from the throne, he allotted to his eldeſt ſon Louis II. the ſovereignty of Italy; to his ſecond ſon Lothaire the territory of Lorrain, with the title of king; and to his youngeſt ſon Charles, ſurnamed the *Bald*, Provence, Dauphiny, and part of the kingdom of Burgundy; ſo that he may be conſidered as properly the king of France. From the year 845 to 857 the provinces ſubjected to his juriſdiction had been infeſted by the annual depredations of the Normans, from whom Charles was at laſt fain to purchaſe peace at a greater expence than might have carried on a ſucceſsful war. The people of Brittany had alſo revolted; and though obliged by the appearance of Charles himſelf, at the head of a powerful army, to return to their allegiance, they no ſooner perceived him again embarraſſed by the incurſions of the Normans, than they threw off the yoke, and under the conduct of their duke Louis ſubdued the neighbouring dioceſe of Rennes; after which exploit Louis aſſumed the title of king, which he tranſmitted to his ſon Heriſpee. By him Charles was totally defeated; and his ſubjects, perceiving the weakneſs of their monarch, put themſelves under the protection of Louis the German. His ambition prompted him to give a ready ear to the propoſal; and therefore, taking the opportunity of Charles's abſence in repelling an invaſion of the Danes, he marched with a formidable army into France, and was ſolemnly crowned by the archbiſhop of Sens in the year 857. Being too confident of ſucceſs, however, and fancying himſelf already eſtabliſhed on the throne, he was perſuaded to diſmiſs his German forces; which he had no ſooner done, than Charles marched againſt him with an army, and Louis abandoned his new kingdom as eaſily as he had obtained it.

Notwithſtanding this ſucceſs, the kingdom of Charles continued ſtill in a very tottering ſituation. The Normans haraſſed him in one quarter, and the king of Brittany in another. He marched againſt the latter in the year 860; but had the misfortune to receive a total defeat after an engagement which laſted two days. The victory was chiefly owing to a noted warrior named Robert le Fort, or the Strong, who commanded the Bretons; but Charles found means to gain him over to his party by inveſting him with the title of Duke of France, including the country which lies between the rivers Seine and Loire.

For ſome time the abilities of Robert continued to ſupport the tottering throne of Charles; but his difficulties returned on the death of that hero, who was killed in repelling an invaſion of the Danes. Some amends was indeed made for his loſs by the death of the king of Lorrain in the year 869; by which event the territories of Charles were augmented by the cities of Lyons, Vienne, Toul, Beſançon, Verdun, Cambray, Viviers, and Urez, together with the territories of Hainault, Zealand, and Holland. Cologne, Utrecht, Treves, Mentz, Straſburgh, with the reſt of the territories of Lothaire, were aſſigned to Louis the German.

All this time the Normans ſtill continued their incurſions to ſuch a degree, that Solomon king of Brittany was perſuaded to join his forces to thoſe of Charles, in order to repel the common enemy. The event proved unfortunate to the Normans; for their principal leaders were beſieged in Angiers, and obliged to purchaſe leave to depart by relinquiſhing all the ſpoil they had taken. Charles thus freed from a formidable enemy, began to aſpire to the imperial crown, which about this time became vacant by the death of Louis. This belonged of right to Louis the German; but Charles, having inſtantly aſſembled a powerful army, marched with it into Italy before Louis could be appriſed of his deſigns; and being favourably received at Rome, the Imperial crown was put upon his head without any heſitation by the Pope, in the year 873. Louis, enraged at his diſappointment, diſcharged his fury on the defenceleſs country of Champagne; and though the approach of Charles obliged him for the preſent to retire, yet he continued his preparations with ſuch vigour, that Charles would in all probability have found him a very formidable adverſary, had he not been taken off by death in the year 877. Charles was no ſooner informed of his brother's deceaſe, than he invaded the dominions of his ſon Louis, who poſſeſſed Franconia, Thuringia, the Lower Lorraine, with ſome other territories in that quarter. The enterpriſe, however, proved unſucceſsful. Charles, though ſuperior in numbers, was defeated with great ſlaughter, and had ſcarce time to reunite his ſcattered forces, when he was informed that the Normans had invaded his territories, laid waſte part of the country, and taken poſſeſſion of the city of Rouen. So many diſaſters affected him in ſuch a manner that he fell dangerouſly ill, and was ſcarce recovered of his ſickneſs when he found himſelf called into Italy to the aſſiſtance of the Pope againſt the

the Saracens, whoſe invaſions were encouraged by the dukes of Beneventum and the Greek emperor. Charles paſſed into Italy with only a few followers; but when he came to Pavia, at which place the pontiff had appointed to meet him, was informed that Carloman king of Bavaria, and ſon of Louis the German, was already in Italy with a powerful army, and laid claim to the imperial title in virtue of his father's right. Charles prepared to oppoſe him by force of arms; but his generals conſpired againſt him, and the ſoldiers declared their reſolution not to paſs the Alps. On this he was obliged to retire to France, at the very moment that Carloman, dreading his power, prepared to return to Germany. This was the laſt of Charles's enterpriſes. His journey brought on a return of his indiſpoſition, which was rendered fatal through the treachery of a Jewiſh phyſician named Zedechias, who adminiſtered poiſon to him under pretence of curing his malady. He expired in a miſerable cottage upon mount Cenis in the 54th year of his age, and 38th of his reign over the kingdom of France.

36
He is poiſoned.

37
Reign of Louis the Stammerer

The ambition of Charles had been productive of much diſtreſs both to himſelf and to his ſubjects. His ſon Louis, ſurnamed, from a defect in his ſpeech, *the Stammerer*, was of a quite different diſpoſition; but his feeble adminiſtration was ill calculated to retrieve matters in their preſent ſituation. He died on the 10th of April 879, while on a march to ſuppreſs ſome inſurrections in Burgundy. He left his queen Adelaide pregnant; who ſome time after his deceaſe was delivered of a ſon, named *Charles*. After his death followed an interregnum; during which a faction was formed for ſetting aſide the children of Louis the Stammerer, in favour of the German princes, ſons to Louis the brother of Charles the Bald. This ſcheme, however, proved abortive; and the two ſons of the late king, Louis and Carloman, were crowned kings of France. Another kingdom was at that time erected by an aſſembly of the ſtates, namely, the kingdom of Provence, which conſiſted of the countries now called *Lyonnois, Savoy, Dauphiny, Franche Comte*, and part of the duchy of Burgundy; and this kingdom was given to duke Boſon, brother in law to Charles the Bald. In 881, both kings of France died; Louis, as was ſuſpected, by poiſon; and Carloman of a wound he received accidentally while hunting. This produced a ſecond interregnum; which ended with the calling in of Charles the Groſs, emperor of Germany. His reign was more unfortunate than that of any of his predeceſſors. The Normans, to whom he had given leave to ſettle in Frieſland, ſailed up the Seine with a fleet of 700 ſhips, and laid ſiege to Paris. Charles, unable to force them to abandon their undertaking, prevailed on them to depart by a large ſum of money. But as the king could not advance the money at once, he allowed them to remain in the neighbourhood of Paris during the winter; and they in return plundered the country, thus amaſſing vaſt wealth beſides the ſum which Charles had promiſed. After this ignominious tranſaction Charles returned to Germany, in a very declining ſtate of health both as to body and mind. Here he quarrelled with his empreſs; and being abandoned by all his friends, he was depoſed, and reduced to ſuch diſtreſs, that he would not even have had bread to eat, had not he been ſupplied by the archbiſhop of Mentz, out of a principle of charity.

On the depoſition of Charles the Groſs, Eudes count of Paris was choſen king by the nobility during the minority of Charles the ſon of Adelaide, afterwards named *Charles the Simple*. He defeated the Normans, and repreſſed the power of the nobility; on which account a faction was formed in favour of Charles, who was ſent for, with his mother, from England. Eudes did not enter into a civil war; but peaceably reſigned the greateſt part of the kingdom to him, and conſented to do homage for the reſt. He died ſoon after this agreement in the year 898.

During the reign of Charles the Simple, the French government declined. By the introduction of fiefs, thoſe noblemen who had got into the poſſeſſion of governments, having theſe confirmed to them and their heirs for ever, became in a manner independent ſovereigns; and as theſe great lords had others under them, and they in like manner had others under them, and even theſe again had their vaſſals; inſtead of the eaſy and equal government which prevailed before, a vaſt number of inſupportable little tyrannies were erected. The Normans, too, ravaged the country in the moſt terrible manner, and deſolated ſome of the fineſt provinces in France. At laſt Charles ceded to Rollo, the king or captain of theſe barbarians, the duchy of Neuſtria; who thereupon became Chriſtian, changed his own name to *Robert*, and that of his principality to *Normandy*.

38
Family of Charles the Great ſupplanted by Hugh Capet.

During the remainder of the reign of Charles the Simple, and the entire reigns of Louis IV. ſurnamed the *Stranger*, Lothaire, and Louis V. the power of the Carlovingian race continually declined; till at laſt they were ſupplanted by Hugh Capet, who had been created duke of France by Lothaire. This revolution happened in the year 987, and was brought about much in the ſame manner as the former one had been by Pepin. He proved an active and prudent monarch, and poſſeſſed ſuch other qualities as were requiſite for keeping his tumultuous ſubjects in awe. He died on the 24th of October 997, leaving his dominions in perfect quiet to his ſon Robert.

39
Robert.

The new king inherited the good qualities of his father. In his reign the kingdom was enlarged by the death of Henry duke of Burgundy, the king's uncle, to whom he fell heir. This new acceſſion of territory, however, was not obtained without a war of ſeveral years continuance on account of ſome pretenders to the ſovereignty of that duchy; and had it not been for the aſſiſtance of the duke of Normandy, it is doubtful whether the king would have ſucceeded.—As Robert was of opinion, that peace and tranquillity were preferable to wide extended dominions with a precarious tenure, he refuſed the kingdom of Italy, and the imperial crown of Germany, both which were offered him. He died on the 20th of July 1030, having reigned 33 years, and lived 60.

40
Henry I.

Robert was ſucceeded by his eldeſt ſon Henry I. who in the beginning of his reign met with great oppoſition from his mother. She had always hated him; and preferred his younger brother Robert, in whoſe favour ſhe now raiſed an inſurrection. By the aſſiſtance of Robert duke of Normandy, however, Henry overcame all his enemies, and eſtabliſhed himſelf firmly upon the throne. In return for this, he ſupported William, Robert's natural ſon, and afterwards king of England, in the poſſeſſion of the duchy of Normandy. Afterwards, however, growing jealous of his power, he not only ſupported the pretenders to the duchy of Normandy ſecretly, but invaded that country himſelf in their favour. This enterpriſe proved unſucceſsful, and Henry was obliged to make peace: but no ſincere reconciliation ever followed; for the king retained a deep ſenſe of the diſgrace he had met with, and the duke never forgave him for invading his dominions. The treaty between them, therefore, was quickly broken; and Henry once more invaded Normandy with two armies, one commanded by himſelf, and the other by his brother. The firſt was haraſſed with continual ſkirmiſhes, and the laſt totally defeated; after which Henry was obliged to agree to ſuch terms as the duke thought proper: but the rancour between them never ceaſed, and was in reality the cauſe of that implacable averſion which for a long ſeries of years produced perpetual quarrels between the kings of France and thoſe of the Norman race in England.

41
Philip.

Henry died in 1059, not without a ſuſpicion of being poiſoned; and was ſucceeded by his eldeſt ſon Philip, at that time in the eighth year of his age. Baldwin earl of Flanders was appointed his guardian; and died in the year 1066, about the time that William of Normandy became king of England. After the death of his tutor, Philip began to ſhow a very inſincere, haughty, and oppreſſive diſpoſition. He engaged in a war with William the Conqueror, and ſupported his ſon Robert in his rebellion againſt him*. But after the death of William, he aſſiſted Robert's brothers againſt him; by which means he was forced to conſent to a partition of his dominions.

In 1092, king Philip being wearied of his queen Bertha, procured a divorce from her under pretence of conſanguinity, and afterwards demanded in marriage Emma daughter to Roger count of Calabria. The treaty of marriage was concluded; and the princeſs was ſent over, richly adorned with jewels, and with a large portion in ready money: but the king, inſtead of eſpouſing her, retained her fortune, and diſmiſſed the princeſs herſelf, carrying off from her huſband the counteſs of Anjou, who was eſteemed the handſomeſt woman in France. With her he was ſo deeply enamoured, that not ſatisfied with the illegal poſſeſſion of her perſon, he procured a divorce between her and her huſband, and prevailed upon ſome Norman biſhops to ſolemnize his own marriage with her. The whole of theſe tranſactions, however, were ſo ſcandalous, that the pope having cauſed them to be reviſed in a council at Autun, in the year 1094, pronounced ſentence of excommunication againſt Philip in caſe he did not part with the counteſs. On his repentance, the cenſure was taken off; but as the king paid no regard to his promiſes, he was, in 1095, excommunicated a ſecond time. He again profeſſed repentance, and was abſolved; but ſoon after, living with the counteſs of Anjou as formerly, he was excommunicated a third time. This conduct, ſo unworthy of a prince, expoſed him to the contempt of the people. Too many of the nobility followed his example, and at the ſame time deſpiſed his authority; not only making war upon each other, but ſpoiling and robbing his ſubjects with impunity.

In the year 1110, Philip prevailed on the court of Rome to have his affair reviewed in an aſſembly at Poictiers; where, notwithſtanding his utmoſt efforts, ſentence of excommunication was a fourth time pronounced againſt him. Yet, in ſpite of all theſe ſentences, as queen Bertha was dead, and the count of Anjou offered, for a large ſum of money, to give whatever aſſiſtance was requiſite for procuring a diſpenſation, Philip at laſt prevailed, and the counteſs was proclaimed queen of France. But though the king's domeſtic affairs were now in ſome meaſure quieted, his negligence in government had thrown the affairs of the nation into the greateſt diſorder. He therefore aſſociated with him in the government his eldeſt ſon Louis. This prince was the very reverſe of his father; and by his activity and reſolution, keeping conſtantly in the field with a conſiderable body of forces, he reduced the rebellious nobility to ſubjection, and, according to the beſt hiſtorians, at this time ſaved the ſtate from being utterly ſubverted.

For theſe ſervices the queen looked upon the young prince with ſo jealous an eye, and gave him ſo much diſturbance, that he found it neceſſary to retire for ſome time into England; where he was received by king Henry I. with the greateſt kindneſs. He had not been long at court, before Henry received, by an expreſs, a letter from Philip; telling him, that, for certain important reaſons, he ſhould be glad if he cloſely confined his ſon, or even diſpatched him altogether. The king of England, however, inſtead of complying with this infamous requeſt, ſhowed the letter to Louis, and ſent him home with all imaginable marks of reſpect. Immediately on his return he demanded juſtice; but the queen procured poiſon to be given him, which operated ſo violently that his life was deſpaired of. A ſtranger, however, undertook the cure, and ſucceeded; only a paleneſs remained in the prince's face ever afterwards, though he grew ſo fat that he was ſurnamed *the Groſs*.

On his recovery, the prince was on the point of revenging his quarrel by force of arms; but his father having cauſed the queen to make the moſt humble ſubmiſſions to him, his reſentment was at length appeaſed, and a perfect reconciliation took place.

42
Louis the Groſs.

Nothing memorable happened in the reign of king Philip after this reconciliation. He died in the year 1108, and was ſucceeded by his ſon Louis the Groſs. The firſt years of his reign were diſturbed by inſurrections of his lords in different places of the kingdom; and theſe inſurrections were the more troubleſome, as they were ſecretly fomented by Henry I. of England, that by weakening the power of France his duchy of Normandy might be the more ſecure. This quickly brought on a war; in which Henry was defeated, and his ſon William obliged to do homage to Louis for the duchy of Normandy. As the kings of England and France, however, were rivals, and exceedingly jealous of each other, the latter eſpouſed the cauſe of William the ſon of Robert duke of Normandy, whom Henry had unjuſtly deprived of that duchy. This brought on a new war; in which Louis receiving a great defeat from Henry, was obliged to make peace upon ſuch terms as his antagoniſt thought

* See *England*, n° 89.

proper. The tranquillity, however, was but of ſhort duration. Louis renewed his intrigues in favour of William, and endeavoured to form a confederacy againſt Henry; but the latter found means not only to diſſipate this confederacy, but to prevail upon Henry V. emperor of Germany to invade France with the whole ſtrength of the empire on one ſide, while he prepared to attack it on the other. But Louis having collected an army of 200,000 men, both of them thought proper to deſiſt. Upon this, the king of France would have marched into Normandy, in order to put William in poſſeſſion of that duchy. His great vaſſals, however, told him they would do no ſuch thing; that they had aſſembled in order to defend the territories of France from the invaſion of a foreign prince, and not to enlarge his power by deſtroying that balance which aroſe from the king of England's poſſeſſion of Normandy, and which they reckoned neceſſary for their own ſafety. This was followed by a peace with Henry; which, as both monarchs had now ſeen the extent of each other's power, was made on pretty equal terms, and kept during the life of Louis, who died in 1137, leaving the kingdom to his ſon Louis VII.

43 Louis VII. a weak prince. The young king was not endowed with any of thoſe qualities which conſtitute a great monarch. From the ſuperſtition common to the age in which he lived, he undertook an expedition into the Holy Land, from whence he returned without glory. In this expedition he took his queen Eleanor along with him; but was ſo much offended with her gallantries during her ſtay there, as well as her behaviour afterwards, that he divorced her, and returned the duchy of Guienne which he received with her as a portion. Six weeks after this ſhe married Henry duke of Normandy, count of Anjou and Maine, and heir-apparent to the crown of England. This marriage was a very great mortification to Louis; and procured him the ſirname of *the Young*, on account of the folly of his conduct. When Henry aſcended the throne of England, ſome wars were carried on between him and Louis, with little advantage on either ſide: at laſt, however, a perfect reconciliation took place; and Louis took a voyage to England, in order to viſit the ſhrine of St Thomas of Canterbury. On his return he was ſtruck with an apoplexy; and though he recovered for that time, yet he continued ever after paralytic on the right ſide. After having languiſhed for about a year under this malady, he died on the 18th of September 1180, leaving the kingdom to his ſon Philip.

44 Philip the Great. This prince, ſurnamed *The Gift of God, The Magnanimous*, and *The Conqueror*, during his lifetime; and, as if all theſe titles had fallen ſhort of his merit, ſtyled *Auguſtus* after his death,—is reckoned one of the greateſt princes that ever ſat on the throne of France, or any other.—It doth not, however, appear that theſe titles were altogether well founded. In the beginning of his reign he was oppoſed by a ſtrong faction excited by his mother. Them indeed he repreſſed with a vigour and ſpirit which did him honour; but his taking part with the children of Henry II. of England, in their unnatural conteſts with their father, and his treacherous combination with John to ſeize his brother's kingdom when he was detained in priſon by the emperor of Germany, muſt be indelible ſtains in his character, and for ever exclude him from the title of *Magnanimous*. As to military ſkill and perſonal valour, he was evidently inferior to Richard I. of England; nor can his recovering of the provinces held by the Engliſh in France, from ſuch a mean and daſtardly prince as king John, intitle him with any juſtice to the ſurname of *Conqueror*. In politics he was evidently the dupe of the Pope, who made uſe of him to intimidate John into a ſubmiſſion, by promiſing him the kingdom of England, which he never meant that he ſhould enjoy. An account of theſe tranſactions, which are the principal ones of his reign, is given under the article ENGLAND, nº 121——141.

45 Reign of Louis IX. Philip died in 1223, and was ſucceeded by his ſon Louis VIII. and he, in 1226, by Louis IX. afterwards ſtyled *St Louis*. This prince was certainly poſſeſſed of many good qualities, but deeply tinctured with the ſuperſtition of the times. This induced him to engage in two croiſades. The firſt was againſt the Saracens in Egypt: in which he was taken priſoner by the Infidels, and treated with great cruelty; but at laſt obtained his ranſom, on condition of paying a million of pieces of gold, and ſurrendering the city of Damietta. He no ſooner regained his liberty, than he entered Syria with a view of doing ſomething worthy of his rank and character. From this expedition he was obliged to return ſooner than he intended, by the news of the deceaſe of his mother queen Blanch, whom he had appointed regent in his abſence, and who had managed the national affairs with the greateſt prudence. The king, however, found many diſorders in the kingdom upon his return; and theſe he ſet himſelf to reform with the utmoſt diligence. Having ſucceeded in this, he yielded to Henry III. of England, the Limouſin, Querci, Perigord, and ſome other places; on conſideration of Henry and his ſon prince Edward their renouncing, in the fulleſt manner, all pretenſions to Normandy and the other provinces of France which the Engliſh had formerly poſſeſſed.

The reputation of this monarch for candour and juſtice was ſo great, that the barons of England, as well as king Henry III. conſented to make him umpire of the differences which ſubſiſted between them. But though he decided this matter very juſtly, his deciſion was not productive of any good effect. At laſt the king, having ſettled every thing relating to his kingdom in a proper manner, ſet out on another croiſade for Africa; where he died of the plague, on the 25th of Auguſt 1270.

46 Philip the Hardy. Notwithſtanding the misfortunes of Louis, his ſucceſſor Philip, ſurnamed the *Hardy*, continued the war againſt the Infidels with great vigour. Being reinforced by his uncle Charles king of Sicily, he brought the war to a more fortunate concluſion than his predeceſſor had been likely to do. The Saracens were defeated in two engagements, and the king of Tunis obliged to ſue for peace; offering at the ſame time to double the tribute he formerly paid to the crown of Sicily; to reimburſe the expences of the war; and to permit the Chriſtian religion to be freely propagated throughout his dominions. Having accompliſhed this, the two princes ſet ſail for Europe; but the ſeeds of the diſtemper which had infected the army in Africa not being eradicated, broke forth on their arrival in Sicily, and raged for ſome time with great violence.

Beſides a vaſt number of common people, the king's brother John, his queen Iſabella, with his brother and ſiſter-in-law the king and queen of Navarre, and his uncle and aunt the count and counteſs of Poictiers, periſhed by this dreadful malady.

On his return to France, Philip took poſſeſſion of the counties of Provence and Thoulouſe; married his ſecond ſon, though then very young, to the only daughter of the king of Navarre; while he himſelf eſpouſed Mary the daughter of the duke of Brabant, reckoned one of the moſt beautiful princeſſes of the age. He ſteadily enforced the regulations of his predeceſſor, who had prohibited the barons from making private wars upon one another; procured the friendſhip of Edward I. of England by ceding to him the county of Agenois; and entered into a war with Spain in order to ſupport the pretenſions of his nephews, the infants de la Cerda, to the throne of Caſtile.

47 French maſſacred in Sicily.

The events of this war were of no great importance; and the king's attention was quickly called off from them by the death of his eldeſt ſon Louis at the age of twelve years. This diſaſtrous event happened in the year 1175, not without a ſuſpicion of poiſon; and the young queen, Mary, was accuſed by a ſurgeon named La Broſſe as guilty of his death. Philip gave ſome credit to the accuſation; but having applied to a nun, who pretended to be inſpired, for full ſatisfaction, her anſwer proved fatal to La Broſſe. The queen being cleared by this pretended propheteſs, La Broſſe was accuſed of a treaſonable correſpondence with the king of Caſtile, and condemned to death. The manner of his trial and execution, however, were ſuch, that the tide of popular favour was turned; La Broſſe was by the voice of the people declared to be innocent, and the king and queen themſelves loudly condemned. During theſe unfavourable circumſtance, the Sicilians, over whom Charles of Anjou had eſtabliſhed his authority, inſtigated by John of Procida, a noble exile, came to a reſolution of freeing themſelves at once from the French yoke by a general maſſacre. This cruel reſolution was accordingly put in execution; and the French, to the number of 8000, murdered in one night; after which Peter of Arragon ſailed to the iſland, where he was received by the inhabitants as their king and ſaviour. Charles was ſenſibly affected by this misfortune; and having laid ſiege to Meſſina, ſailed directly to Marſeilles, where he obtained a powerful reinforcement. But during his abſence on this occaſion his ſon, to whom he had entruſted the care of the ſiege, having raſhly ventured an engagement with the Spaniſh fleet, was entirely defeated and taken priſoner; which ſo much affected the father that he died of grief, and Sicily was inſeparably attached to the houſe of Arragon.

The misfortunes of Charles were followed by others equally great to Philip himſelf. Pope Martin IV. in the warmth of his zeal for the cauſe of the duke of Anjou, had excommunicated Pedro king of Arragon, and beſtowed his kingdom on Charles of Valois, a younger ſon of the king of France. In attempting to defend himſelf againſt the execution of this unjuſt ſentence, Pedro was mortally wounded; but, ſoon after, the French fleet being defeated by that of Arragon, the king was ſo much affected by the misfortune that he fell ſick. His diſeaſe was augmented by the heat of the climate and the fatigues of war; ſo that, quite worn out with grief and infirmities, he expired at Perpignan in the 41ſt year of his age, and 16th of his reign.

48 Reign of Philip the Fair.

By the death of Philip the Hardy the French crown devolved on his ſecond ſon, called alſo Philip, and from the beauty of his perſon ſurnamed *the Fair*; who had eſpouſed the princeſs of Navarre, and at the time of his acceſſion was in his 17th year. By the marriage with this princeſs he had obtained the counties of Champaigne and Brie; yet with all this increaſe of power he found himſelf unable to ſupport the war in which his predeceſſor had engaged. For this reaſon he thought proper to abandon the intereſt of the Infants de la Cerda, and ſettle the differences with Caſtile. The treaty was concluded by the mediation of Edward I. of England; at whoſe interceſſion Charles the Lame, ſon to the duke of Anjou already mentioned, was releaſed from his captivity; Edward himſelf paying part of his ranſom. On this Charles conſented to renounce his claim on Sicily; and Philip himſelf promiſed that his kinſman, Philip of Valois, ſhould renounce all pretenſions to the crown of Arragon. In return for this generoſity, the latter obtained the eldeſt daughter of Charles, with the territories of Anjou and Maine as a dowry.

49 Difference with England.

The tranquillity procured by this treaty, however, was ſoon interrupted by differences with Edward the promoter of it; pope Boniface VIII. and Guy de Dampier, count of Flanders. The difference with England took place by a mere accident. A Norman and an Engliſh veſſel having met off the coaſt of Bayonne, and having both occaſion for water, the crews met and quarrelled at the ſame ſpring. A Norman was killed in the ſquable by his own weapon, with which he aſſaulted an Engliſhman, as the latter pretended; but however the matter was, complaints were made by the Normans to Philip; who, without giving himſelf much trouble to enquire into the merits of the cauſe, inſtantly allowed them to redreſs their ſuppoſed injuries. On this a kind of piratical war commenced between the two nations, in which the two ſovereigns for ſome time took no active part; though other nations interfered; the Iriſh and Dutch ſeamen ſiding with the Engliſh, and thoſe of Flanders and Genoa with the French. Thus the powers on both ſides were gradually augmented, till at laſt the affair became ſo ſerious, that in one engagement 15,000 French are ſaid to have periſhed. Philip, alarmed at ſuch a carnage, ſummoned the king of England as his vaſſal to attend; and, on his refuſal, declared his eſtates in France to be forfeited. After a number of negociations, Philip declared that he would be ſatisfied with the nominal ceſſion of the province of Guienne, which he engaged inſtantly to reſtore to the king of England as ſoon as it ſhould be put into his hands. Edward complied with his demand; but no ſooner had the French monarch obtained poſſeſſion of that country, then he perſiſted in the forfeiture of the Engliſh poſſeſſions in France; which treacherous proceeding inſtantly produced a war betwixt the two nations. Edward, that he might the better defend himſelf againſt ſuch a formidable adverſary, concluded a treaty with the emperor Adolphus, together with the counts of Brittany, Holland, Bar, Juliers, Gueldres, and Flanders;

50 Peace concluded.

ders; while Philip ſtrengthened himſelf by an alliance with John Baliol of Scotland; and this laid the foundation of that ſtrict union which took place between France and Scotland for two centuries. During this war the French made a deſcent on the coaſt of England, and deſtroyed the town of Dover; while Edward, in revenge, landed in Gaſcony with an army of 50,000 men. No great exploits, however, were performed with this mighty armament; and both parties finding themſelves pretty equally matched, conſented to a ſuſpenſion of arms for two years; during which a peace was finally concluded by the mediation of pope Boniface VIII. Guienne was reſtored; Edward eſpouſed Margaret the ſiſter of Philip; while his daughter Iſabella was given in marriage to the prince of Wales.

Both Philip and Edward behaved to the allies whom they had engaged in their cauſe with equal perfidity. Baliol was abandoned by Philip to the reſentment of Edward; while Guy, earl of Flanders, was left equally expoſed to the reſentment of Philip.

51 Difference with Pope Boniface.

The reconciliation betwixt the French and Engliſh monarchs was ſoon followed by a difference with pope Boniface, whom they had appointed mediator between them. Senſible of his aſſuming diſpoſition, however, they had inſerted in the reference made to him, that he was choſen as a private man, and not as the ſucceſſor of St Peter. The haughty pontiff, however, ſoon ſhowed, that he was not by any means to be treated as a private perſon, and a conteſt with Philip quickly enſued. Boniface began with forbidding the clergy to grant the king any ſubſidies without firſt obtaining the conſent of the Holy See, under the pain of excommunication. Philip revenged himſelf by prohibiting any eccleſiaſtics from ſending money out of the kingdom without his leave; and by protecting the Colonnas, who were the implacable enemies of Boniface. By this his holineſs was ſo much irritated that he ſent a moſt abuſive letter to Philip; after which he ſummoned the clergy of France to a council at Rome; which Philip retaliated, by ſeizing the temporalities of thoſe who obeyed the ſummons, and recalling his brother Charles of Valois, who had the title of the *pope's general*. Senſible, however, of the danger that attended this conteſt, he diſpatched two emiſſaries, under pretence of conciliating the differences, to levy ſuch a body of troops as might execute his hoſtile purpoſes againſt the holy father. With theſe he ſuddenly inveſted the pope in his native city of Anegnia; and while the bull was preparing for the excommunication of Philip, and releaſing his ſubjects from their obedience, the pope himſelf was obliged to ſurrender priſoner to the troops of the prince whom he deſigned to anathematize.

52 Death of Boniface.

Though Boniface had been at this time delivered up to the troops of Philip through the treachery of the people of Anegnia, yet he was no ſooner taken priſoner and brought to diſtreſs, then they reſcued him from his guards and conveyed him to Rome, where he ſoon after died of grief and ſhame. His ſucceſſor Benedict revoked the excommunication of Boniface, and attempted to regain the allegiance of Philip by gentle means: but before this could be effected, he himſelf was cut off by death, not without ſtrong ſuſpicions of poiſon. After his deceaſe Philip offered to procure the papal chair for Bertrand archbiſhop of Bourdeaux, provided he would condemn the memory of Boniface, reſtore the honours and eſtates of the Colonnas which had been forfeited, allow him, for five years, the tenths of the clergy of France, and comply with a requeſt which at that time it was not proper to divulge.

54 The pope fixes his reſidence at Avignon.

Bertrand having complied with the terms propoſed by the king, aſcended the papal throne by the name of *Clement V.* but narrowly eſcaped being killed on his return from the cathedral of Lyons, by the falling of a wall which had been overloaded by the number of people who came to ſee the proceſſion; by which accident the duke of Brittany was killed, and the king and Count of Valois conſiderably bruiſed. The new pope fixed his reſidence at Avignon, where he punctually complied with all the conditions of the treaty, except that of condemning the conduct of Boniface, which he abſolutely refuſed to do; and, inſtead of doing ſo, vindicated with much ſolemnity, after having inquired into the matter, or pretended to do ſo. The other condition, which Philip had at firſt concealed, was diſcovered by the death of the emperor Albert of Auſtria; after which event he deſired Clement to aſſiſt him in placing his brother Charles of Valois on the Imperial throne. But his holineſs, apprehenſive of the danger which might accrue to himſelf from being ſurrounded with the powerful relations of Philip, urged the diet to proceed inſtantly to an election; recommending to them Henry of Luxemburg as a proper perſon to fill the Imperial throne. In this ſcheme he ſucceeded ſo well, that the election was over before Philip could arrive at Avignon; and the only conſolation the French monarch could obtain for his diſappointment was the poſſeſſion of the city of Lyons, which had hitherto maintained an independency under its archbiſhop; but was now perſuaded to ſubmit to the authority of Philip.

54 Expedition of Philip againſt the earl of Flanders.

In the mean time Guy, earl of Flanders, being abandoned by his ally Edward king of England, was obliged to throw himſelf on the mercy of the French monarch, who had ſent his brother, Charles of Valois, with a powerful army to invade his dominions. From the latter indeed he had obtained a promiſe, that if he could not, within a year, compoſe the difference ſubſiſting between him and Philip, he ſhould be at liberty to retire, and purſue what meaſures he pleaſed. But Philip in order to gratify the reſentment which his queen entertained againſt the captive prince detained him, with two of his ſons, in cloſe confinement; while he himſelf entering Flanders in triumph, was every where received as ſovereign of the country; and at his departure appointed John de Chattillo, a relation of the queen, to govern thoſe newly acquired territories.

The new governor took care to repair the fortifications which had been ſuffered to decay by reaſon of the aſſiduous application of the Flemings to trade; but being of a very haughty and tyrannical diſpoſition, and the poverty of the times not allowing his maſter to keep regular garriſons, an inſurrection quickly took place. This would have been effectually quelled by the diligence of the magiſtrates, had not Chatillon unluckily entered Bruges, and publicly diſplayed two hogſheads of ropes, which he threatened to employ in the execution of the inhabitants. On this they flew to arms, maſſacred 1500 French; Chatillon himſelf being obliged to eſcape their fury by ſwimming over the town ditch. The inſurgents now, daily gathering ſtrength, ſoon amounted to an army of 60,000 men who laid ſiege to Courtray. Here they were raſhly attacked in their trenches by the count d'Artois, who met with the reward of his temerity, being cut off with 20,000 of his troops. Philip determined on revenge; though the raiſing another army obliged him to debaſe the coin of the kingdom. Thus, however, he was enabled to enter Flanders with ſuch force as would probably have ſubdued the whole country, had not Edward artfully communicated to the queen of France, as a ſecret, a feigned correſpondence between the French nobility and the court of Rome; by which falſe intelligence the king was induced to abandon the enterpriſe without performing any thing worthy of the armament he had fitted out. The war was continued for ſome time longer; but the attempts of Philip were conſtantly defeated by the ſteady valour of the Flemings; and the only recompence Philip obtained for all his trouble and expence was the city of Courtray.

53 The conqueſt of the country prevented by Edward III. of England.

54 Expulſion of the knights Templars.

The other remarkable tranſactions of this reign were the expulſion and confiſcation of the eſtates of the Templars, who at that time enjoyed immenſe poſſeſſions in France. The confiſcations took place without any form of trial, and upwards of 50 of them were put to death in a cruel manner. The grand-maſter, with three of his principal officers, were burnt by a ſlow fire in the preſence of the king himſelf. The whole body of theſe unfortunate knights had been accuſed of the moſt groſs and abominable ſenſualities. The particulars were revealed, or pretended to be ſo, by two criminals who received their pardon for the diſcoveries they made; and theſe diſcoveries were confirmed by the confeſſion of the Templars themſelves. But this confeſſion was afterwards retracted, as being extorted from them by the fear of abſolute deſtruction; and thoſe who ſuffered, maintained their purity to the laſt: and on the whole, it was believed that Philip conſulted his avarice rather than his juſtice by this cruel execution. The latter part of his life was embittered by domeſtic misfortunes. His three daughters-in-law, Margaret daughter of the duke, and Jean and Blanch, of the count of Burgundy, who had married his three ſons Louis, Philip, and Charles, were accuſed of infidelity to their huſbands. After a ſevere examination, Margaret and Blanch were condemned to perpetual impriſonment; in which ſituation Margaret was afterwards ſtrangled by order of her huſband Louis. Their paramours, Philip and Walter de Launay, two brothers, were flayed alive, and afterwards hung upon a gibbet, with an uſher of the chamber, who had been their confident. The uneaſineſs of mind which Philip ſuffered on this account is ſuppoſed to have impaired his health, and he died of a conſumption in the year 1395, the 47th of his age, and 30th of his reign.

55 Reign of Louis the Boiſterous.

On the acceſſion of Louis, ſurnamed the *Boiſterous* on account of his violent temper, he found his treaſury ſo much exhauſted, that he was obliged to delay for ſome time the ceremony of his coronation with his new queen, Clemence, daughter of the king of Hungary. Finding the kingdom otherwiſe in a very diſtracted ſtate, he applied himſelf very diligently to appeaſe the diſcontents of his ſubjects, and conciliate their affection by every means in the power. In this he was aſſiſted by his uncle Charles of Valois, on whom he at length entirely devolved the government of the kingdom. This regent, however, behaved with ſuch cruelty as is ſuppoſed to have proved fatal to the king himſelf; for having put to death a nobleman named *Enguerrand de Poitier de Marigni*, who enjoyed the confidence of the late king, this cruelty was ſo much reſented, that his friends were thought to have adminiſtered poiſon to the king; who, expired ſuddenly after drinking a glaſs of cold water, in the 26th year of his age, and ſecond of his reign. Immediately after his death, Charles prepared to diſpute the ſovereignty with the brothers of the late ſovereign. Philip count of Poictou, the eldeſt brother, was at that time at Rome aſſiſting in the election of a new pope; and it was not until a month after the death of his brother that he was able to put an end to the intrigues which took place on that occaſion: but on his arrival in France, the throne was aſſigned to him by the unanimous voice of the people. His proſpects, however, were for a ſhort time clouded by the queen-dowager Clemence being delivered of a ſon, who has been inrolled among the kings of France under the name of *John I.* His death in three weeks ſecured the throne to Philip; who on account of the tallneſs of his ſtature was ſurnamed the *Long*. His conduct proved ſuperior to that of his predeceſſor, who had unſucceſsfully attempted to ſubdue the Flemings, and had even ſuffered himſelf to be duped by their count; but Philip, by his victorious behavour, ſo reduced them, that they compelled their ſovereign to conſent to a peace upon honourable terms. He ſummoned Edward II. of England to do homage for his poſſeſſions in France; but that monarch, finding himſelf involved in difficulties, which rendered the viſit inconvenient, ſent excuſes to Philip, which he was pleaſed to accept. As the French monarch had formerly taken the croſs during the lifetime of his father, he now propoſed to put his vow in execution; but was diſſuaded from this by the pope himſelf, at whoſe inſtance he ſent an army into Italy to put an end to the contending factions of the Guelphs and Gibelines, who for ſo long time filled that country with blood and ſlaughter. The event proved unfortunate; and the diſgrace was rendered more mortifying by a contagious diſtemper, which ſwept off many thouſands of French ſubjects. This was ſuppoſed by the ſuperſtitious people of thoſe times to be occaſioned by the Jews, who had conſpired with the Saracens to poiſon the ſprings; and that the execution of the project was committed to ſome lepers who lived by themſelves in hoſpitals richly endowed. On this a perſecution was inſtantly commenced againſt theſe unfortunate men, and great numbers of them were burnt alive; while the Jews in general were abandoned to the rage of the populace, who inſulted their perſons, and plundered their houſes without remorſe.

56 Reign of Philip the Long.

57 Unfortunate expedition into Italy.

The remaining part of the reign of Philip was ſpent in attempting to regulate the internal concerns of his kingdom. A deſign had been formed by his predeceſſors of eſtabliſhing a certain ſtandard for the coin, weights, and meaſures, throughout France: and this was adopted by Philip; who, in order to carry it more effectually into execution, purchaſed from the counts of Valois, Clermont, and Bourbon, their right of coinage within their own dominions. But notwithſtanding all his endeavours for this purpoſe, he never could bring the ſcheme to bear; nor indeed could he in any degree conciliate the affection of his ſubjects. He died of a fever and dyſentery in the year 1322, the 28th of his age, and 6th of his reign.

58
Reign of Charles the Fair.

By the death of Philip, the crown of France devolved on his brother Charles IV. who had obtained the ſurname of *Fair*. After ſettling ſome diſputes with the duke of Burgundy, his next ſtep was to diſſolve his marriage with Blanch, who ſtill continued in priſon, and to eſpouſe Mary the daughter of Henry emperor of Germany. This marriage was contracted with a view to the imperial crown itſelf, which had been ſo long ſeparated from that of France; and in 1325 an opportunity offered for Charles to gratify his ambition. At that time the Imperial dignity was diſputed between Louis of Bavaria and Frederic of Auſtria; the latter of whom had been taken priſoner in a battle with Louis. But pope John, who entertained an implacable hatred againſt Louis, fulminated the ſentence of excommunication againſt him, intruſting the execution of it to Leopold the brother of Ferdinand. The king of France was induced to embark in the ſame cauſe, by a promiſe of the ſpoils of Bavaria; while Frederic himſelf conſented to relinquiſh his pretenſions to the empire which he had ſo unſucceſsfully maintained. Louis, however, by inſtantly releaſing his priſoner, and diſmiſſing him in an honourable manner, engaged his friendſhip, and diſarmed his moſt formidable antagoniſt. But the pope was not to be ſo diſappointed. A conſiderable ſum of money induced Leopold to perſevere in his hoſtilities, while it was determined that a new council of electors ſhould be held in order to transfer the Imperial crown to Charles. In purſuit of this viſionary ſcheme the king of France ſet out for the frontiers of Germany with a ſplendid army; but ſoon found that there was no poſſibility of accompliſhing his wiſhes. Leopold alone, from motives of intereſt, remained his friend; the reſt ſhowed the greateſt indifference; and even his brother-in-law the king of Bohemia abſented himſelf from the diet; while in a ſhort time the death of the queen put an end to all connections with that crown.

On the deceaſe of Mary, Charles eſpouſed Joanna daughter to the count of Evreux: and in order to avert the calamities to be feared from an infant ſucceſſion, he entered into an alliance with Robert king Scotland; by which it was provided, that ſhould either of the ſovereigns die without an heir apparent, the ſtates of the kingdom ſhould fill the vacant throne, and the ſurvivor of the two kings ſhould with his whole force ſupport the legality of the nomination againſt any other competitor: though even this proved inſufficient to avert the danger which now threatened the kingdom, as ſhall be explained in the ſequel.

59
Candidates for the regency and kingdom after the death of Charles.

Charles died in the year 1328, in the 34th year of his age, leaving his queen pregnant; and as the ſucceſſion depended on the fruit of the queen's pregnancy, a regent in the mean time was neceſſary; and two candidates inſtantly appeared for this important poſt, urging at the ſame time their right to the crown as well as to the regency. Theſe were Philip de Valois, couſin-german to the deceaſed king; the other, Edward III. king of England, who aſpired to the throne in right of his mother, and the nephew of Charles the Fair. His pretenſions, however, were eaſily ſet aſide, and Philip was confirmed in the regency; from which he ſoon after ſtepped into the throne, on the queen being delivered of a daughter; from which circumſtance he acquired the ſurname of *Fortunate*. But though the pretenſions of Edward, both to the regency and crown, were unanimouſly rejected by the people, it was ſtill impoſſible for Philip to think of the claims of ſuch a formidable rival without uneaſineſs. He therefore ſummoned the Engliſh monarch to do homage for his poſſeſſions in France; and, upon his not anſwering his ſummons, forfeited them, and ſeized his revenues. This at laſt induced Edward to croſs the ſea and pay his homage; which Philip conſented to receive in any form, upon condition of a proper explanation being afterwards given: but as this was ſtudiouſly delayed after the return of the king of England, the province of Guienne was again ſeized by the French monarch. Edward, unwilling to loſe his continental dominions, or involve himſelf in a war for the ſake of mere ceremony, ſent over a formal deed, by which he acknowledged that he owed liege homage to France. Thus the flame was ſmothered for the preſent; and would perhaps have been entirely extinguiſhed, had it not been for the intrigues of Robert of Artois, brother-in-law to the king of France himſelf, who had been expelled his country, and had taken refuge in England. By him he was perſuaded to renew his pretenſions to the crown of France, which of neceſſity produced a war.

Diſputes with Edward III. of England,

For ſome time, indeed, neither party made any open declaration of hoſtilities; but as both monarchs were poſſeſſed of great prudence and ſagacity, they ſoon penetrated each other's deſigns. Philip, under pretence of taking the croſs, began to make prodigious armaments, ſtrengthening himſelf at the ſame time by alliances on every ſide; while Edward, determining to renew his claim to the crown of France, projected the conqueſt of Scotland. This, however, he could not accompliſh; and in the mean time Philip, in order to favour the Scots, with whom he was in alliance, ſuffered his ſubjects to make irruptions into Guienne.

61
Edward's firſt expedition.

In 1337, the war broke out openly. Philip having detached a ſquadron of his fleet againſt the Infidels, employed the reſt, conſiſting chiefly of Genoeſe veſſels, againſt the Engliſh. As in this war it was of great importance which ſide was taken by the Flemings, theſe people were courted by both parties. Louis count of Flanders declared for Philip, but his ſubjects were more inclined to king Edward. James Arteville a brewer the moſt able and artful man in the country, governed them at that time as much as if he had been their prince; and the advantages ariſing from the Engliſh commerce determining him in favour of Edward, that prince, at his requeſt, embarked for Sluys with a numerous army. Here he arrived in 1338; and on his firſt landing, it was reſolved that the German princes in alliance with him ſhould act againſt France. But for this a pretence was wanting. The vaſſals of the empire could not act by Edward's orders, or even, as his allies, without directions from the emperor, and he was in league with France. This difficulty, however, was ſoon overcome: The French had made themſelves maſters of Cambray, and the emperor reſolved that it ſhould be retaken. With this view he created Edward *Vicar General of the Empire;* an empty title, but which ſeemed to give him a right of commanding the ſervices of the princes of Germany. The Flemings, who were vaſſals of France, likewiſe pretended ſcruples at invading the territories of their liege lord. To quiet theſe, Edward, by the advice of Arteville, aſſumed the title of *King of France;* and by virtue of this right challenged their aſſiſtance for dethroning Philip de Valois, the uſurper of his kingdom. This ſtep, which he feared would beget endleſs animoſities and jealouſies, he did not take without heſitation; and, according to Mr Hume, from this time we may date the commencement of that great animoſity which the Engliſh have always borne to the French.

Edward's firſt attempt was upon the city of Cambray, to which he laid ſiege; but in a ſhort time he was prevailed upon by Robert d'Artois to raiſe the ſiege and march into Picardy. This country he entered with an army of near 50,000 men, compoſed moſtly of foreigners. Philip came within ſight of him with an army of near 100,000, compoſed chiefly of native ſubjects; and it was daily expected that a battle would enſue. But the Engliſh monarch was averſe to engage againſt ſo great a ſuperiority; and Philip thought it ſufficient if he eluded the attacks of his enemy, without running any unneceſſary hazard. The two armies faced each other for ſeveral days; mutual defiances were ſent; and Edward at laſt retired into Flanders, and diſperſed his army.

Such was the fruitleſs, and almoſt ridiculous concluſion of Edward's firſt expedition; which had plunged him into the greateſt difficulties. He had contracted near L. 300,000 of debt; he had anticipated all his revenue; he had pawned every thing of value which belonged either to himſelf or his queen; nay, he was obliged in ſome meaſure even to pawn himſelf to his creditors, by deſiring their permiſſion to go over to England in order to procure ſupply, and by promiſing on his word of honour to return in perſon if he did not remit their money. On his arrival in England, however, he procured a large ſupply, ſufficient to enable him to make all the neceſſary preparations for a new invaſion; and ſo certain were the Engliſh that France would now be conquered, that the parliament, before Edward's departure, proteſted that they owed him no obedience as king of France, but that the two kingdoms muſt remain for ever diſtinct and independent.

62
His ſecond expedition.

63
The French entirely defeated at ſea.

The king of England ſet out on his ſecond expedition with a fleet of 240 veſſels. Philip had prepared a fleet of 400 veſſels, manned with 40,000 men; which he ſtationed off Sluys, in order to intercept him in his paſſage. The two fleets met on the 13th of June, 1340; but the Engliſh, either by the ſuperior abilities of Edward, or the greater dexterity of his ſeamen, gained the wind of the enemy, and had the ſun in their backs; and with theſe advantages began the action. The battle was fierce and bloody: the Engliſh archers, whoſe force and addreſs were now much celebrated, galled the French on their approach; and when the ſhips grappled together, the example of the king and the nobility who were with him ſo animated the ſeamen and ſoldiers, that they maintained every where a ſuperiority over the enemy. The Flemings obſerving the battle, hurried out of their ports, and brought a reinforcement to the Engliſh; which coming unexpectedly, had a greater effect than in proportion to its power and numbers. Two hundred and thirty ſhips were taken; and 30,000 Frenchmen were killed, with two of their admirals: the loſs of the Engliſh was inconſiderable, compared to the greatneſs and importance of the victory. None of Philip's courtiers, it is ſaid, dared to inform him of the event; till his fool or jeſter gave him a hint, by which he diſcovered the loſs he had ſuſtained.

After this great victory, Edward landed his forces, and laid ſiege to Tournay. Philip marched to its relief with a very numerous army; but acted with ſo much caution, that Edward found himſelf in a manner blocked up in his camp: and the counteſs dowager of Hainault, ſiſter to Philip, mother-in-law to Edward, and ſiſter-in-law to Robert d'Artois, coming out of a convent, to which ſhe had retired, interpoſed with ſo much ſpirit and addreſs, that ſhe engaged all parties to agree to a truce for a year, and might perhaps have brought about a peace if ſhe had ſurvived.

64
Edward invited into France a third time.

In 1341, however, Edward's ambition was once more excited by the invitation of the count de Mountfort, who had poſſeſſed himſelf of the province of Brittany, and applied to Edward to ſecond his claims. An offer of this kind entirely coincided with Edward's moſt ſanguine deſires. He was happy in the promiſed aſſiſtance of Mountfort, an active and valiant prince, cloſely united to him by intereſt, and thus opening to him an entrance into the heart of France. Theſe flattering proſpects, however, were for a while damped by the impriſonment of Mountfort; whoſe aims being diſcovered, he was beſieged in the city of Nantz, and taken. But Jane of Flanders his wife ſoon made up for the loſs of her huſband. This lady courageouſly undertook to ſupport the falling fortunes of her family. She aſſembled the inhabitants of Rennes, where ſhe then reſided; and carrying her infant ſon in her arms, deplored her misfortunes, and attempted to inſpire the citizens with an affection for her cauſe. The inhabitants of Nantz inſtantly eſpouſed her intereſts, and all the other fortreſſes of Brittany embraced the ſame reſolution. The king of England was appriſed of her efforts; and was intreated to ſend her ſuccours with all poſſible expedition to the town of Hennebone, in which place ſhe reſolved to ſuſtain the attacks of the enemy. Charles de Blois, Philip's general, anxious to make himſelf maſter of ſo important a fortreſs as Hennebone, and ſtill more to take the counteſs a priſoner, ſat down before the place with a large army, and conducted the ſiege with indefatigable induſtry. The defence was no leſs vigorous: ſeveral ſallies were made by the garriſon, in which the counteſs herſelf was ſtill the moſt active, and led on to the aſſault. Obſerving one day that their whole army had quitted the camp to join in a general ſtorm, ſhe ſallied out by a poſtern at the head of 300 horſe, ſet fire to the enemy's tents and baggage, put their ſuttlers and ſervants to the ſword, and occaſioned ſuch an alarm, that the French deſiſted from the aſſault, in order to cut off her communication with the town. Thus intercepted, ſhe retired to Auray, where ſhe continued five or ſix days; then returning at the head of 500 horſe, ſhe fought her way through one quarter of the French camp, and returned to her faithful citizens in triumph. But the beſiegers had at length made ſeveral breaches in the walls; and it was apprehended that a general aſſault, which was hourly expected, would be fatal. A capitulation was therefore propoſed, and a conference was already begun, when the counteſs, who had mounted on a high tower, and was looking towards the ſea with great impatience, deſcried ſome ſhips at a diſtance. She immediately exclaimed that ſuccours were arrived, and forbid any further capitulation. She was not diſappointed in her wiſhes: the fleet ſhe diſcerned carried a body of Engliſh gentlemen, with 6000 archers, whom Edward had prepared for the relief of Hennebone, but who had been long detained by contrary winds. They entered the harbour under the conduct of Sir Walter Manny, one of the moſt valiant commanders of his time. This relief ſerved to keep up the declining ſpirits of the Bretons until the time appointed by the late truce with Edward was expired, on which he was at liberty to renew the war in greater form.

The ſuccours under Sir Walter Manny were quickly followed by a more conſiderable reinforcement commanded by Robert of Artois, who made himſelf maſter of the city of Vannes ſoon after his arrival: but the Bretons ſoon recovered the city, and Robert was compelled to relinquiſh his prize after receiving a mortal wound. Edward himſelf, eager to revenge the death of his ally, ſoon landed at Morbain near Vannes with an army of 12,000 men. With this ſmall number he undertook at once the ſiege of Vannes, Nantz, and Rennes: but by dividing his forces, he failed in every enterpriſe, and gave an opportunity to John duke of Normandy, the king of France's eldeſt ſon, to inveſt him in his camp. In this ſituation his proviſions ſoon began to fail; and Edward, notwithſtanding all his valour, would have been obliged to ſurrender, had he not by a train of artful negociations, induced Philip to relinquiſh the advantage he had obtained, and conſent to a truce of three years. This was accompliſhed by the mediation of the court of Rome; and the French monarch was ſoon made ſenſible of the partiality of that court, and the imprudence of the ſtep he himſelf had taken. Edward ſoon found a pretence to renew the war, from the execution of ſome nobles of Brittany, who, he ſaid, were partiſans of Mountfort, and choſe to look upon their puniſhment as an infraction of the the treaty.

Philip now endeavoured to ſecure himſelf againſt the power of his rival by alliances, and by purchaſing the city of Montpelier from the king of Majorca: but in the mean time, the Engliſh, under the command of the earl of Darby, had invaded Guienne, twice defeated the French army commanded by the count de Liſle, and made themſelves maſters of a great number of towns. Philip, by reaſon of the exhauſted ſtate of his treaſury, was for ſome time incapable of making any oppoſition. To recruit his finances, he was obliged to lay a duty on ſalt; which gave ſuch offence to his ſubjects as had almoſt excited a rebellion. When theſe diſcontents were aſſuaged, however, he ſoon raiſed an army of 100,000 men, whoſe courage was further raiſed by the preſence of the dukes of Normandy and Burgundy. The Engliſh general was therefore compelled to ſtand upon the defenſive. One fortreſs after another was ſurrendered to the French: till at length nothing appeared but a total extinction of the power of England upon the continent. In this ſituation, Edward reſolved to bring relief in perſon to his diſtreſſed ſubjects and allies; and accordingly embarked in 1346 at Southampton, on board a fleet of near 1000 ſail, of all dimenſions. He carried with him, beſides all the chief nobility of England, his eldeſt ſon the prince of Wales (afterwards ſurnamed the *Black Prince*); a youth of about 15 years old, and already remarkable both for underſtanding and valour above his age. His army conſiſted of 4000 men at arms, 10,000 archers, 10,000 Welſh infantry, and 6000 Iriſh; all which he landed ſafely at La Hogue, a port in Normandy, which country he determined to make the ſeat of the war.

65 He lands with an army in Normandy.

The intelligence of Edward's landing, and the devaſtation cauſed by his troops, who diſperſed themſelves over the whole face of the country, ſoon ſpread univerſal conſternation through the French court. The rich city of Caen was taken and plundered by the Engliſh without mercy; the villages and towns, even up to Paris, ſhared the ſame fate; and the French had no other reſource but by breaking down their bridges, to attempt putting a ſtop to the invader's career. In the mean time, Philip was not idle in making preparations to repreſs the enemy. He had ſtationed one of his generals, Godemar de Faye, with an army on the oppoſite ſide of the river Somme, over which Edward was to paſs; while he himſelf, at the head of 120,000 fighting men, advanced to give the Engliſh battle. Edward, thus unexpectedly expoſed to the danger of being incloſed and ſtarved in an enemy's country, publiſhed a reward to any that ſhould bring him intelligence of a paſſage over the river Somme. This was diſcovered by a peaſant of the country named Gobin Agace; and Edward had juſt time to get his whole army over the river, when Philip appeared in his rear. Of the battle that enſued, in which the French were overthrown with great ſlaughter, an account is given under the article CRESSY.

66 Calais taken.

Edward next laid ſiege to Calais, which was then defended by John di Vienne, an experienced commander, and ſupplied with every thing neceſſary for defence. It was at length taken, after a twelvemonth's ſiege, the defendant's having been reduced to the laſt extremity by famine and fatigue; for the conſequences of which, ſee the article CALAIS.

From the very beginning of this unfortunate war, Philip had invariably ſhowed himſelf deſirous of peace, and the victory of Creſſy rendered him ſtill more ſo. Edward alſo, notwithſtanding his ſucceſſes, was unable to ſupport the expences of the war any longer. The mediation of the court of Rome was therefore readily accepted, and a truce for three years concluded. At the ſame time, Philip met with ſome recompence for the loſſes he had ſuſtained, by the acquiſition of Dauphiny, which has ever ſince given the title of Dauphin to the eldeſt ſon of the king of France. It was obtained by the reſignation of Humbert prince of Dauphiny; who, being diſappointed in his hopes of marrying Joan, daughter of the duke of Bourbon, gave up his territories to Charles the grandſon of Philip, who had married that lady, himſelf retiring into a convent. Soon after this event, the king himſelf, who had been ſome time a widower, was married to Blanch, the daughter of Philip count of Evreux, and Jane queen of Navarre; and his

67
Death of king Philip.

ſon John to the counteſs of Boulogne. But the happineſs occaſioned by theſe marriages was ſoon interrupted by the death of the king; who expired in the year 1350, the 57th of his age, and 23d of his reign.

68
Infamous conduct of the king of Navarre.

On the death of Philip, his eldeſt ſon John took poſſeſſion of the kingdom; but ſcarcely was he ſeated on the throne, when he diſguſted his nobility by an unſeaſonable act of ſeverity. Robert de Brienne, count of Eu and Guiſnes, had been taken priſoner by the king of England at Caen; and under pretence of negociating his ranſom, had paſſed ſeveral times between France and England; but being accuſed of a treaſonable correſpondence with Edward, he was by order of his ſovereign ſuddenly arreſted, condemned, and beheaded, without any form of trial. At his death, it is ſaid, that he confeſſed his treaſonable practices; but this has not been authenticated by any hiſtorian of credit. Having been conſtable of France, the ſword, the badge of his office, was delivered to Charles de la Carda: but his fate was equally unfortunate with that of his predeceſſor, being ſoon after aſſaſſinated by Charles king of Navarre, ſurnamed *The Wicked*. This prince, celebrated for his perſonal qualifications, but deteſted for his crimes, was the ſon-in-law of John himſelf. He had demanded the duchy of Angouleme of the king; but as the latter had thought proper to beſtow it upon Carda, he had taken the effectual method of revenging himſelf by aſſaſſinating his rival. John did not fail to ſhow a proper reſentment; but ſuch was the weakneſs of his government, that the king of Navarre ſet him at defiance, and would not even condeſcend to the ceremony of aſking pardon until John had ſent him his ſecond ſon as an hoſtage for his perſonal ſecurity. To theſe offences the king of Navarre added another ſtill more atrocious, viz. that of aſpiring to the crown of France itſelf; to which he pretended a right derived from his mother, being grandſon by the female ſide to Louis the Boiſterous. But his more immediate demands were the countries of Champagne and Brie. To obviate all difficulties on this head, however, John beſtowed the duchy of Normandy on his eldeſt ſon Charles; and commanded him to ſeize the eſtates of the king of Navarre. On this the latter ſoon made his appearance at Paris; but John found himſelf obliged to appeaſe his murmurs at the expence of no leſs than 100,000 crowns.

69
He is taken and confined.

All this time the truce with England had been very ill obſerved on both ſides; the French had poſſeſſed themſelves of the port of St Jean d'Angeli; and the Engliſh had ſurpriſed the town of Guiſnes. The rival houſes of Mountfort and Blois ſtill continued their animoſities; while Edward continued to threaten war.—The king of Navarre went on with his intrigues; and even the dauphin was drawn into a confederacy againſt his father. John, however, being informed of their machinations, found means to defeat them effectually. The dauphin was reclaimed by pointing out to him the impropriety of his conduct, and the diſadvantage which muſt unavoidably accrue to himſelf from the connections which he had formed. The king of Navarre was invited, with his principal adherents, to an entertainment, where they were unexpectedly arreſted; the former being ſent priſoner to the chateau Gaillard, and ſeveral of the moſt obnoxious of the latter put to death. The reſt of the conſpirators, inſtead of being diſmayed by this check, immediately ſhowed themſelves in open rebellion; and finding themſelves unable, without further aſſiſtance, to gain their point, they without delay invited over Edward from England.

70
France again invaded by Edward.

That warlike and enterpriſing monarch had never loſt ſight of the object he had originally embraced; and on the expiration of the truce had ſent his ſon, prince of Wales, and, from the colour of his armour, ſurnamed the *Black Prince*, with a fleet towards the coaſt of France. Young Edward had with this fleet entered the mouth of the river Garonne, burnt the towns and villages of Languedoc, and retired with the plunder into the country of Guienne. Edward himſelf, who had likewiſe paſſed over to the continent, waſted the country as far as St Omer; but the French king, notwithſtanding all theſe provocations, determined to avoid a battle, and therefore prohibited his general, the conſtable of Bourbon, from coming to an engagement, though his army was much ſuperior to that of the prince of Wales. With the flower of his troops, however, he purſued Edward from St Omer to Heſdin, where he defied him to a pitched battle; but the latter, without minding his bravadoes, continued his march to Calais, from whence he embarked for England.—After his departure, John called an aſſembly of the ſtates at Paris, where he explained the diſtreſſed ſituation of his finances, and ſhowed ſo fully the neceſſity of aſſiſting him in the defence of the kingdom, that they conſented to maintain an army of 30,000 men during the war. To ſupply the other exigencies of government, they revived the duty on ſalt, and added a variety of other impoſts; but at the ſame time appointed a committee of their own number to take care that the money was ſolely appropriated to the public ſervice.

The ſatisfaction which John received from theſe grants, and the ſuppreſſion of ſome diſturbances which happened about this time, was ſoon overcaſt by the news that the prince of Wales had marched with an army of 12,000 men from Bourdeaux; and, after ravaging the Agenois, Quercy, and the Limouſin, had entered the province of Berry. The young warrior had penetrated into the heart of France with this trifling body of forces, in hopes of joining the duke of Lancaſter in Guienne. But he ſoon found that his ſcheme was impracticable: the country before him was too well guarded to permit his advancing further; and all the bridges behind were broken down, which effectually barred a retreat. In this embarraſſing ſituation, his perplexity was increaſed, by being informed, that the king of France was actually marching at the head of 60,000 men to intercept him. He at firſt thought of retreating: but ſoon finding it impoſſible, he determined calmly to await the approach of the enemy; and, notwithſtanding the diſparity of forces, to commit all to the hazard of a battle.

71
Battle of Poictiers.

It was at a place called *Maupertius*, near Poictiers, that both armies came in ſight of each other. The French king might very eaſily have ſtarved the Engliſh into any terms he thought proper to impoſe; but ſuch was the impatient valour of the French nobility, and ſuch their certainty of ſucceſs, that it might have been equally fatal to attempt repreſſing their ardour to engage. In the mean time, while both armies were drawn out, and expecting the ſignal to begin, they were ſtopped by the appearance of the cardinal Perigord, who attempted to be a mediator between them. However, John, who made himſelf ſure of victory, would liſten to no other terms than the reſtitution of Calais; with which the Black Prince refuſing to comply, the onſet was deferred till the next morning, for which both ſides waited in anxious ſuſpence.

During this interval, the young prince ſtrengthened his poſt by new entrenchments; and placed 300 men in ambuſh, with as many archers, who were commanded to attack the enemy in flank during the heat of the engagement. Having taken theſe precautions, he ranged his army in three diviſions: the van was commanded by the earl of Warwick, the rear by the earls of Saliſbury and Suffolk, and the main body by himſelf. In like manner, the king of France arranged his forces in three diviſions; the firſt commanded by the duke of Orleans; the ſecond by the dauphin, attended by his younger brothers; while he himſelf led up the main body, ſeconded by his youngeſt and favourite ſon, then about 14 years of age. As the Engliſh were to be attacked only by marching up a long narrow lane, the French ſuffered greatly from their archers, who were poſted on each ſide, behind the hedges. Nor were they in a better ſituation upon emerging from this danger, being met by the Black Prince himſelf at the head of a choſen body of troops, who made a furious onſet upon their forces, already in great diſorder. A dreadful overthrow enſued: thoſe who were as yet in the lane recoiled upon their own forces; while the Engliſh troops who had been placed in ambuſh, took that opportunity to encreaſe the confuſion, and confirm the victory. The dauphin and the duke of Orleans were among the firſt that fled. The king of France himſelf made the utmoſt efforts to retrieve, by his valour, what his raſhneſs had forfeited: but his ſingle courage was unable to ſtop that conſternation which had now become general through his army; and his cavalry ſoon flying, he found himſelf expoſed to the enemy's fury. At length, ſpent with fatigue, and deſpairing of ſucceſs, he thought of yielding himſelf a priſoner; and frequently cried out, that he was ready to deliver himſelf to his couſin the prince of Wales. The honour of taking him, however, was reſerved for a much more ignoble hand; he was ſeized by Dennis de Morbec, a knight of Arras, who had been obliged to fly his country for murder.

72
French defeated.

73
King John taken priſoner.

In April following, the prince conducted his royal priſoner through London, attended by an infinite concourſe of people of all ranks and ſtations. His modeſty upon this occaſion was very remarkable: the king of France was clad in royal apparel, and mounted on a white ſteed diſtinguiſhed by its ſize and beauty; while the prince himſelf rode by his ſide upon a mean little horſe, and in very plain attire.

74
Miſerable ſituation of France.

This dreadful defeat, which happened in the year 1356, almoſt entirely ruined the French affairs; and the miſeries which enſued from this cauſe were greatly augmented by inteſtine commotions. The dauphin, who had now aſſumed the government, was altogether unable to govern a turbulent and ſeditious people at ſuch a criſis. An aſſembly of the ſtates, which he called, took the opportunity to limit the power of the prince, impeach the former miniſters, and demand the liberty of the king of Navarre; the treaſurer of the crown was murdered by one Marcel, a partizan of that worthleſs prince, who had filled the city of Paris with confuſion by his intrigues. The aſſaſſin whom Marcel employed was dragged, by order of the dauphin, from an altar where he had taken refuge, and inſtantly put to death. The biſhop of Paris reſented the indignity done to the church; and Marcel avenged the fate of his adherent by murdering both the mareſchals, who had ſeized him in the preſence of the dauphin; and ſo near him, that his clothes were ſtained with their blood. The prince indignantly aſked him, if he was to be involved in the ſame deſtruction? when Marcel affected to provide for his ſafety by putting upon him a blue hood, the badge of the adherents of Navarre. The public diſorders were now alſo augmented by the eſcape of the king of Navarre from confinement; and though the dauphin was even aſſured that he had adminiſtered a doſe of poiſon to him, he was obliged ſtill to pay him ſome appearance of regard. A ſcheme was even formed by the chiefs of the ſedition to change the government, to veſt all the power in the commons, and leave the king no more than an empty title; but though this was favourably received by the city of Paris, it was entirely rejected by the other cities of the kingdom. The dauphin was likewiſe recogniſed as regent by the ſtates general, and the inhabitants of Picardy and Champagne took up arms in his cauſe.

75
The king of Navarre eſcapes from priſon.

76
Inſurrections and tumults of the peaſants.

In this diſaſtrous ſtate of affairs, the miſeries of the people were heightened by a new and unexpected evil. The peaſants, who had been all along oppreſſed by the nobles, were now treated in ſuch a manner, that they roſe in great numbers to revenge themſelves; the caſtles of the nobility were raſed to the ground, their wives and daughters raviſhed, and themſelves put to the moſt cruel torments. At laſt they were obliged to arm in their own defence. The duke of Orleans cut off 10,000 of them in the neighbourhood of Paris; 12,000 were maſſacred by the king of Navarre; 9000, who had laid ſiege to the town of Meaux, where the dauphineſs and three other ladies of the firſt rank reſided, were routed and purſued with dreadful ſlaughter by an officer in the ſervice of Edward. Amidſt theſe confuſions, Marcel, the ſeditious leader already mentioned, periſhed in a tumult of his own raiſing; and the moſt virtuous and prudent people of the nation ſupported the pretenſions of the dauphin. His moſt dangerous enemy was the king of Navarre, who had allured to his ſtandard numbers of thoſe Norman and Engliſh adventurers who had followed Edward into France, and there been left to ſeek their fortunes; where they aſſociated themſelves under the name of the *Companions*. By ſuch a formidable competitor the dauphin was reduced almoſt to the laſt extremity, when his hopes were revived by an unexpected propoſal from his rival, of peace upon equitable and moderate terms. Hiſtorians in general have aſcribed this to the natural levity of the king of Navarre; but ſome have been of opinion, that he acted from prudential motives, and that he juſtly ſuppoſed it would be more eaſy to deal with the dauphin, who was his own kinſman, and humbled by ſo many misfortunes, than with an haughty and imperious conqueror like Edward.

77
Peace between the dauphin and king of Navarre.

On the the expiration of the truce in 1359, Edward again ſet ſail for France, and anchored before Calais

with

78 A new invaſion of France by Edward.

79 He concludes a peace.

with a fleet of 1100 ſail, aſſumed the title of *King of France*, and augmented his army to 100,000 men. The dauphin, finding himſelf unable to withſtand ſo great a power, was obliged to act on the defenſive; chooſing the city of Paris for his ſtation, and allowing the Engliſh to ravage all the open country. Thus they were allowed to penetrate through Picardy into Champagne; but the city of Rheims, where Edward deſigned to have been crowned king of France, baffled their utmoſt efforts. From Champagne, therefore, which was already laid waſte, the Engliſh monarch marched into Burgundy; pillaging Tonnere, Gaillon, and Avalon. Burgundy was ſaved by the payment of 100,000 merks, and a like ſum was paid for Nivernois. At laſt, after a long and deſtructive march, Edward arrived at the gates of Paris; but the prudence of the dauphin and citizens of that metropolis had rendered it impregnable to the attacks of famine as well as the aſſaults of an army. Thus the war went on till the year 1360, when the king of England was inclined to peace, as is ſaid, by a dreadful tempeſt, to which his army was expoſed while encamped in the fields round Chartres. His conduct, however, may more reaſonably be derived from other motives. Notwithſtanding all the victories he had gained, the French nation ſhowed not the leaſt favour to his claim of ſucceſſion; the king of Navarre was a dangerous rival, and the caution of the dauphin in avoiding an engagement deprived him of the advantages he might expect from his valour and military ſkill. Thus conferences for a peace were opened at Bretigny in the Chartraine; and it was at laſt concluded on the following conditions, *viz.* That king John ſhould pay for his ranſom, at different periods, three millions of crowns of gold (about a million and an half Sterling): Edward ſhould for ever renounce all claim to the kingdom of France; and ſhould remain poſſeſſed of the territories of Poictou, Xaintonge, l'Agenois, Perigord, the Limouſin, Quercy, Rouvergne, l'Angoumois, and other diſtricts in that quarter, together with Calais, Guiſnes, Montreuil, and the county of Ponthieu on the other ſide of France. Some other ſtipulations were made in favour of the allies of England, as a ſecurity for the execution of theſe conditions.

80 John unable to pay his ranſom, returns to England.

81 Dies, and is ſucceeded by Charles the Wiſe.

Upon John's return to his dominions, he found himſelf very ill able to ratify thoſe terms peace that had been juſt concluded. He was without finances, at the head of an exhauſted ſtate; his ſoldiers without diſcipline, and his peaſants without ſubordination. Theſe had riſen in great numbers; and one of the chiefs of their banditti aſſumed the title of *The Friend of God and the Terror of Man.* A citizen of Sens, named *John Gouge*, alſo got himſelf, by means of his robberies, to be acknowledged king; and he ſoon cauſed as many calamities by his devaſtations, as the real king had brought on by his misfortunes. Such was the ſtate of that wretched kingdom upon the return of its captive monarch: and yet ſuch was his abſurdity, that he immediately prepared for a croiſade into the Holy Land, before he was well replaced on the throne. Had his exhauſted ſubjects, been able to equip him for this chimerical project, it is probable he would have gone through with it; but their miſeries were ſuch, that they were even too poor to pay his ranſom. This was a breach of treaty that John would not ſubmit to; and he was heard to expreſs himſelf in a very noble manner upon the occaſion; "Though (ſays he) good faith ſhould be baniſhed from the reſt of the earth, yet ſhe ought ſtill to retain her habitation in the breaſt of kings." In conſequence of this declaration, he actually returned to England once more; and yielded himſelf a priſoner, ſince he could not be honourably free. It is ſaid by ſome, that his paſſion for the counteſs of Saliſbury was the real cauſe of his journey: but we want at this time the foundations for ſuch an injurious report. He was lodged in the Savoy, the palace where he had reſided during his captivity; and ſoon after he cloſed a long and unfortunate reign, by his death, which happened in the year 1384, about the 56th year of his age.

Charles, ſurnamed *the Wiſe*, ſucceeded his father on the throne of France; and this monarch merely by the force of a finely conducted policy, and even though ſuffering ſome defeats, reſtored his country once more to tranquillity and power. He quelled and diſſipated a ſet of banditti, who had aſſociated themſelves under the name of *Companions*, and who had long been a terror to the peaceable inhabitants. He had them inrolled into a body, and led them into the kingdom of Caſtile, againſt Peter, ſurnamed *the Cruel*, whom his ſubjects had dethroned, and who, by means of an alliance with the Engliſh, endeavoured to get himſelf reinſtated upon the throne. In conſequence of theſe alliances, the Engliſh and French again came to an engagement; their armies on the one ſide commanded by the Black Prince; on the other, by Henry of Tanſtamarre, and Bertand du Gueſclin, one of the moſt conſummate generals and accompliſhed characters of the age in which he lived. However, the uſual good fortune of the Engliſh prince prevailed; the French loſt above 20,000 men, while only 4 knights and 40 private men on the ſide of the Engliſh were ſlain.

82 Bad ſucceſs of the Engliſh.

Nevertheleſs, theſe victories were attended with very few good effects. The Engliſh, by their frequent levies, had been quite exhauſted, and were unable to continue an army in the field. Charles, on the other hand, cautiouſly forbore coming to any deciſive engagement; but was contented to let his enemies waſte their ſtrength in attempts to plunder a fortified country. When they were retired, he then was ſure to ſally forth, and poſſeſs himſelf of ſuch places as they were not ſtrong enough to defend. He firſt fell upon Ponthieu; the citizens of Abbeville opened their gates to him; thoſe of St Valois, Rue, and Crotoy, imitated the example; and the whole country was, in a little time, reduced to total ſubmiſſion. The ſouthern provinces were, in the ſame manner, invaded by his generals with equal ſucceſs: while the Black Prince, deſtitute of ſupplies from England, and waſted by a cruel and conſumptive diſorder, was obliged to return to his native country, leaving his affairs in the ſouth of France in a deſperate condition.

In this exigence, the reſentment of the king of England was excited to the utmoſt pitch; and he ſeemed reſolved to take ſignal vengeance on his enemies on the continent. But the fortunate occaſion was now elapſed; and all his ſucceeding deſigns were marked with ill ſucceſs. The earl of Pembroke and his whole army were intercepted at ſea, and taken priſoners by Henry king of Caſtile. Sir Robert Knolles, one of his generals on the continent, at the head of 30,000 men, and was defeated by Bertrand de Gueſclin; while the duke of Lancaſter, at the head of 25,000 men, had the mortification of ſeeing his troops diminiſhed one half by flying parties, without ever coming to a battle.

At laſt, the Engliſh affairs were totally ruined by the death of the Black Prince and king Edward. On receiving this news, the armies of Charles attacked the Engliſh on all ſides. One under the command of the duke of Burgundy, entered Artois; another entered Auvergne, under the command of the duke of Berry; that which acted in Guienne was commanded by the duke of Anjou; and the forces in Bretagne were under the conſtable Gueſclin; the king himſelf had a powerful body of troops, that he might be able to repair any accident which ſhould happen through the chance of war. The conſtable joined the duke of Burgundy, who found it difficult to oppoſe Sir Thomas Felton and the Seneſchal of Bourdeaux. Soon after his arrival, the conſtable attacked and defeated them, making both the commanders priſoners of war. This victory was ſo well purſued, that, at the cloſe of the campaign 1377, Bayonne and Bourdeaux, with the diſtricts about them, and the fortreſs of Calais with its dependencies, were all the places left to the England on the continent.

83
Death of Charles.

Thus Charles eſtabliſhed once more the houſe of Valois on the throne of France, but did not long live to enjoy his good fortune. He died in the year 1379, at the age of 44, of the conſequences of poiſon formerly given him by the king of Navarre, as has already been mentioned. The immediate operation of this poiſon had been ſuſpended by the ſkill of a phyſician ſent by the emperor Charles IV. He opened an iſſue in his arm, the running of which preſerved his life; but the phyſician declared, that whenever it ſhould dry up, the conſequence would be fatal. Not long before his death, Charles had commenced a proceſs againſt the king of Navarre for this crime. Several of the aſſociates of the latter ſuffered on this occaſion, and the king himſelf was deprived of his poſſeſſions in Normandy, as well as his lordſhip of Montpelier, which had been given him in lieu of the counties of Champagne and Brie, and the duchy of Burgundy which he had claimed. He did not long ſurvive the death of the French monarch whom he deſtroyed. His death was ſingular and very terrible; for having been afflicted with the leproſy, he had been obliged to make uſe of ſome bandages dipped in ſulphur and afterwards ſteeped in brandy. Theſe took fire by the careleſſneſs of a page, and the unfortunate prince was burnt to death.

84
And of the king of Navarre.

85
Reign of Charles VI.

Charles V. was ſucceeded by his ſon Charles VI. ſurnamed the *Well-beloved,* who at the time of his acceſſion to the throne was only 12 years of age. The duke of Anjou, eldeſt brother to the late king, had been appointed guardian during the minority of the prince; but he being totally unfit for the office, and diſtinguiſhed only for his rapacity and ambition, readily reſigned his charge to the dukes of Burgundy and Bourbon, the former uncle to the king by his father's ſide, the later by his mother's. None of theſe tutors, however, proved faithful to the truſt repoſed in them. The duke of Anjou ſeized the plate and treaſures of the late king, in order to ſupport his ambitious enterpriſes. At that time Joan, infamous for her profligacy, reigned in Naples. She had appointed one Charles Durazzo, who was her relation, to ſucceed her in the throne; but the inhuman wretch murdered his benefactreſs, who with her laſt breath revoked her grant of the kingdom to him, and beſtowed it upon the duke of Anjou. His influence at the French court enabled him to waſte the treaſures of the kingdom in ſupport of his pretenſions; though he proved ultimately unſucceſsful, his forces being conſtantly defeated and his deſigns fruſtrated by the ſuperior ſkill of his adverſary. The duke of Burgundy, inſtead of inſtructing his pupil in the ways of virtue, indulged him in every kind of vicious pleaſure, hoping thereby to gain his favour afterwards. The citizens of Paris, oppreſſed by taxes, broke out into tumults, and were quelled with difficulty; while the mal-adminiſtration of Philip the duke of Burgundy ſoon involved the nation in hoſtilities with the Flemings. Philip invaded their country at the head of an army of 80,000 men, along with whom was the young king, accompanied by the principal nobility of France. The firſt operations of war were favourable to the Flemings; but they were at length totally defeated on the banks of the river Lis, where their leader, with 25,000 of his followers periſhed. This victory was followed by the ſubmiſſion of the whole country; but the ſatisfaction of the king at this event was diſturbed by new ſeditions and revolts in the city of Paris, and other great towns of the kingdom. His return, however, at the head of a victorious army, ſoon reduced them to their duty, and ſeveral of the revolted cities were ſeverely puniſhed; at the ſame time that the death of the duke of Anjou having freed him from the immediate dependence on his tutors, he aſſumed the reins of government into his own hands in the year 1384.

86
Flanders invaded.

The genius which Charles began to diſplay in his early years, raiſed the hopes of the nation; but theſe were ſoon overcaſt, and greater misfortunes than ever were now about to enſue. The young king, whoſe marriage began to be a ſubject of attention to the council, refuſed to comply with the forms in uſe among his predeceſſors, and inſiſted upon ſeeing the perſon deſigned for his conſort. An interview was accordingly contrived betwixt him and Iſabella daughter to the duke of Bavaria; where he fell in love with that princeſs, and afterwards married her. His adminiſtration was for ſome time prudent and vigorous. He conciliated the affections of his people by reſtoring their privileges, puniſhing their oppreſſors, and relieving them from the taxes which had been impoſed in his minority. He reduced the Flemings to ſubmit to the authority of his uncle the duke of Burgundy; detached 15,000 archers and 1500 men at arms to aſſiſt the Scots in their incurſions into England; and in 1385 fitted out a prodigious armament againſt England. A vaſt fleet was aſſembled in the harbour of Sluys, and a very numerous army in the neighbourhood. According to ſome writers, the armament conſiſted of 1200 ſhips, 20,000 foot differently armed, 20,000 cavalry, and 20,000 croſs-bow men. There was beſides a vaſt wooden edifice or floating town, which was contrived for the protection of the ſoldiers when landed: but all theſe preparations were at laſt brought

87
Marries Iſabella daughter to the duke of Bavaria.

brought to nothing through the obſtinacy of the duke of Berry; who, having been originally againſt this meaſure, carried on his part of the armament ſo ſlowly, that he did not arrive at Sluys till the middle of September, when the ſeaſon was ſo far advanced, that no invaſion was practicable. A ſtorm that happened ſoon after, drove the greateſt part of the fleet on ſhore, and beat the wooden edifice all to pieces; the remains of which the king beſtowed on the duke of Burgundy, to whom he gave alſo the port of Sluys, which was then very commodious, and of the utmoſt importance.

88 Is ſeized with lunatic fits.

89 Diſturbances about a regency.

90 An accident occaſions a relapſe in the king.

The deſtruction of the French fleet was only a prelude to calamities of a more extraordinary nature. The Sieur de Craon, a profligate nobleman, had been entruſted by the court of France with a conſiderable ſum of money for the ſupport of the duke of Anjou, at the time he was reduced to diſtreſs by his Italian expedition. This money he had diſſipated at Venice; but, by the credit of the duke of Orleans, the king's brother, he had obtained his pardon, and returned to court. Here he attempted to gratify his private reſentment by the aſſaſſination of Oliver Cliſſon the conſtable, whom he ſuſpected of having promoted his diſgrace. This veteran hero was attacked, on his return from the hotel de St Pol, by a band of 20 ruffians againſt whom he defended himſelf with wonderful intrepidity, when at laſt he fell after receiving more than 50 wounds. Happily, however, he recovered notwithſtanding his being mangled in this manner; while the aſſaſſin to ſcreen himſelf from vengeance, fled for protection to the duke of Brittany. The king demanded the aſſaſſin to be given up to him in chains, but the duke anſwered, that he knew nothing of him: to which the king giving no credit, marched with all his forces into his territories. When the army arrived at Mans, the king was ſeized was a ſlow fever; but could not be prevailed upon to reſt or take phyſic. On the 5th of Auguſt 1391, having marched all day in the heat of the ſun, a miſerable, ragged, wild-looking fellow, darted from behind a tree, and laying hold of the briddle of his horſe, cried out, "Stop! where are you going, king? You are betrayed;" and immediately withdrew again into the wood. The king paſſed on, not a little diſturbed; and ſoon after one of the pages, who rode behind and carried his lance, overcome with heat, fell aſleep, and let it fall upon the helmet which was carried by the other. The king, hearing the noiſe, looked about: and perceiving the page lifting the lance, killed him immediately: then riding furiouſly with his ſword drawn, he ſtruck on every ſide of him, and at every perſon, till he broke his ſword; upon which one of his gentlemen leaped up behind him, and held his arm. He fell ſoon after, and lay as if he had been dead; ſo that being taken up and bound in a waggon, he was carried back to Mans, where he lay two days in a lethargy, after which he came a little to himſelf, and expreſſed great concern at the blood he had ſhed in his delirium. The people, who had expreſſed the greateſt concern for his diſtemper, were equally rejoiced at the news of his recovery; but unfortunately it was ſoon diſcovered, that he no longer poſſeſſed that ſtrength of judgment and underſtanding for which he had formerly been remarkable. Hence a regency became indiſpenſably neceſſary; and the competition for it brought to light the characters of the queen and duke of Orleans, which had not hitherto been diſplayed to public view. The former of theſe was a moſt beautiful and accompliſhed princeſs; but vindictive, violent, and intriguing; inſenſible to natural affection, but eaſily acceſſible to flattery, and ready to yield to every impulſe of lawleſs paſſion. The duke of Orleans was equally remarkable for his perſonal accompliſhments, and had married Valentina daughter of the duke of Milan; but his engagements with that princeſs did not prevent him from engaging in a number of licentious amours, and among the reſt, as was ſuppoſed, with his ſiſter-in-law Iſabella. During the king's illneſs he openly aſpired at the regency; but his pretenſions were over-ruled by the ſtates, the adminiſtration of affairs being for the preſent conferred on the duke of Burgundy. In a few months indeed the health and underſtanding of the king ſeemed to be ſufficiently reſtored; but in the year 1393 it was again diſturbed by an accident no leſs extraordinary than the former had been. An entertainment had been given in honour of the marriage of one of the queen's attendants. At this ſix maſques entered the apartment, diſguiſed like ſatyrs, in linen clothes covered with roſin, and while warm ſtuck over with down. Theſe were the king and five of his lords. The ducheſs of Berri paid attention to the king though ſhe did not know him, and engaged in converſation with him. In the mean time the duke of Orleans, ignorant of the conſequence, out of diverſion ran a lighted torch againſt one of them. His whole dreſs was inſtantly in a flame, and the fire was from him communicated to all the reſt. The maſques, notwithſtanding the dreadful ſituation they were in, called out, "Save the king; ſave the king!" On which the ducheſs of Berri, recollecting that it muſt be him with whom ſhe had engaged in converſation, wrapped him in her cloak, and preſerved him from farther danger. Only one of the reſt eſcaped by jumping into a ciſtern of water; the other four periſhed in the flames. The terror which the king underwent by this accident inſtantly occaſioned a relapſe; and he continued delirious at intervals as long as he lived. During this ſtate of inſanity he was intractable by every perſon except Valentina ducheſs of Orleans: who ſeemed to have as great an influence over him as her huſband the duke had over the mind of the queen. So great was the power indeed which ſhe had over the king in this deplorable ſtate, that in thoſe ſuperſtitious times it was ſuppoſed by many to be the effect of magic. Others, with more probability, aſcribed it to her ſuperior charms as a woman; and this idea inſtantly produced her a number of enemies among her own ſex. The ducheſs of Burgundy, particularly, by her hatred, and the quarrel between the two ladies, ſoon extended itſelf to their huſbands. Amidſt their diſſenſions, however, they did not entirely neglect the adminiſtration of public affairs; they ſtrove to conciliate the affection of the parliament by preſerving the rights of the commons inviolate; and they endeavoured to check and inordinate paſſion for gaming, which began to appear about this time, and to ſubſtitute manly and martial exerciſes in its place.

During the intervals of his reaſon, Charles frequently aſſumed the government into his own hands; and as the war ſtill continued with England, though in

91 Interview betwixt the king of France and England.

a languid manner, the French monarch, in one of theſe lucid intervals, had an interview with Richard king of England, in order to put an end to hoſtilities, of which both were equally weary. Still, however, their claims were ſo difficult to be adjuſted, that they could do no more than conclude a truce for 25 years; during which ſpace it was hoped that a laſting peace might take place. Richard gave up Cherburg to Charles, and Breſt to the duke of Brittany: a marriage was alſo concluded betwixt the king of England and Iſabella the daughter of Charles, though the latter was then only ſeven years of age; but by reaſon of the tender age of the princeſs, this marriage was never conſummated.

92 Unhappy fate of the ſuccours ſent to the Hungarians.

During this unfortunate reign, France was ſtill farther weakened by the ſuccours ſent to the Hungarians againſt the Turks. On this fatal expedition upwards of 1000 of the braveſt and moſt experienced knights were ſent under the conduct of John count of Nevers, eldeſt ſon of the duke of Burgundy; the count of Eu conſtable of France; John de Vienne admiral of France; and the count of Marche, a prince of the blood-royal; together with De Courcy, one of the beſt and moſt experienced captains in Chriſtendom. The prudent counſels of this veteran, however, were not obeyed by the youthful warriors by whom he was accompanied. Attacking the enemy therefore raſhly, and while heated with wine, they were all either killed or taken priſoners. Notwithſtanding this diſaſter, however, aſſiſtance was ſent in the year 1400 to Wanceſlaus emperor of Germany; and the duke of Orleans, who commanded the army on this occaſion, acquitted himſelf ſo well that he acquired the duchy of Luxemburg for himſelf, and left his ally ſatisfied: but while the friendſhip of France was thus courted by foreign powers, the kingdom itſelf was in the moſt miſerable ſituation. The king's diſtemper ſeemed daily to gain ground; while the diſcordant intereſts of the contending parties kept the whole nation in a ferment. The moſt violent animoſity took place betwixt the dukes of Orleans and Burgundy. The former, by means of his own intereſt with the queen, and the aſcendancy his ducheſs had over the king, for ſome time got the better of his rival, and was made lieutenant general and governor of the kingdom; but having preſumed on his power to levy new impoſts on the people, and oppreſſing alſo the churchmen, whom in that ſuperſtitious age he ought by all means to have let alone, he was deprived of his authority, and obliged to yield to the duke of Burgundy. For ſome time, however, theſe powerful rivals were kept within ſome bounds by the mediation of the duke of Bourbon, who ſeems to have been the only grandee who maintained a pure and unſpotted character; but by his death in 1404, the unhappy nation was left totally expoſed to their relentleſs fury. In 1405, the queen and duke of Orleans again ſeized the adminiſtration; but were ſoon deprived of it by the unanimous voice of the people. During this period Charles and his children were neglected and abandoned to diſtreſs; but they were relieved by the duke of Burgundy on his obtaining the regency; and Iſabella, with the duke of Orleans, was obliged to retire from Milan. A ſudden return of the king's reaſon and underſtanding for a much longer time than uſual, now deprived both parties of their power; and the adminiſtration was veſted in the queen and a council compoſed of princes of the blood.

93 Violent commotions in France.

The two rival dukes, thus prohibited from interfering in public affairs, exerciſed themſelves in committing hoſtilities againſt the Engliſh, with whom the truce had been lately concluded. They were encouraged to this infraction of the treaty by the unſettled ſituation of the affairs of Henry IV.: but their attempts proving unſucceſsful, the truce was renewed after obtaining reſtoration of the princeſs, who had been married to Richard II. as has been already mentioned. The failure of their enterpriſes produced a new ſcene of diſcord betwixt the dukes, who mutually threw the blame upon each other. By the intreaties of the duke of Berri they were apparently reconciled; but the duke of Burgundy pretended friendſhip only in order to take the more ſignal vengeance. To this he was now further inflamed by jealouſy. Having hired a band of ruffins to execute his bloody purpoſe, the duke was one evening attacked by eighteen of them while attended only by two pages. A Norman gentlemen whom the duke had deprived of an employment; headed the aſſaſſins, and in perſon attacked the duke. At the firſt blow he cut off his hand, at the ſecond he ſtruck him from his mule, and at the third put an end to his life. His wife Valentina was ſo concerned at his death, that ſhe died ſoon after. The duke of Burgundy eſcaped to Flanders; and the whole nation was rent into two factions called the *Burgundians* and *Armagnacs;* the latter being the title of the party of the duke of Orleans, from Armagnac the father-in-law of that prince. A dreadful confuſion enſued: the duke of Burgundy ſoon returned to France, and extorted a pardon from the unhappy king, who was now no longer able to reſiſt him: and we may have ſome notion of the ſtate of the kingdom in general from being told, that 2000 people periſhed in one tumult in the capital. The king himſelf was alternately the priſoner of each party, and alternately transferred the power from the one to the other as he happened to fall into their hands. This therefore was thought by Henry V. of England a favourable opportunity to recover from France thoſe grants that had been formerly given up by treaty. But previouſly, to give his intended expedition the appearance of juſtice, he ſent over ambaſſadors to Paris, offering a perpetual peace and alliance, on condition of being put in poſſeſſion of all thoſe provinces which had been raviſhed from the Engliſh during ſome former reigns, and of eſpouſing Catharine, the French king's daughter, in marriage, with a ſuitable dowry. Though the French court was at that time extremely averſe to war, yet the exorbitance of theſe demands could not be complied with; and Henry very probably made them in hopes of a denial. He therefore aſſembled a great fleet and army at Southampton; and having allured all the military men of the kingdom to attend him, from the hopes of conqueſt, he put to ſea, and landed at Harfleur, at the head of an army of 6000 men at arms, and 24,000 foot, moſtly archers.

94 Duke of Orleans aſſaſſinated.

95 Invaſion by Henry V. of England.

His firſt operations were upon Harfleur: which being preſſed hard, promiſed at a certain day to ſurrender, unleſs relieved before that time. The day arriving, and the garriſon unmindful of their engagement, ſtill reſolving to defend the place, Henry ordered an aſſault to be made, took the town by ſtorm, and put all the garriſon to the ſword. From thence, the victor advanced farther into the country, which had been already rendered deſolate by factions, and which he now totally laid waſte. But although the enemy made a feeble reſiſtance, yet the climate ſeemed to fight againſt the Engliſh; a contagious dyſentery carrying off three parts of Henry's army. In this ſituation he had recourſe to an expedient common enough in that barbarous age, to inſpire his troops with confidence in their general. He challenged the dauphin who commanded in the French army, to ſingle combat, offering to ſtake his pretenſions on the event. This challenge, as might naturally be expected, was rejected; and the French, though diſagreeing internally, at laſt ſeemed to unite at the appearance of the common danger. A numerous army of 14,000 men at arms, and 40,000 foot, was by this time aſſembled under the command of count Albert, and was now placed to intercept Henry's weakened forces on their return. The Engliſh monarch, when it was too late, began to repent of his raſh inroad into a country where diſeaſe and a powerful army every where threatened deſtruction; he therefore thought of retiring into Calais. In this retreat, which was at once both painful and dangerous, Henry took every precaution to inſpire his troops with patience and perſeverance; and ſhowed them in his own perſon the brighteſt example of fortitude and reſignation. He was continually haraſſed on his march by flying parties of the enemy; and whenever he attempted to paſs the river Somme, acroſs which his march lay, he ſaw troops on the other ſide ready to oppoſe his paſſage. However, he was ſo fortunate as to ſeize by ſurpriſe a paſſage near St Quintin, which had not been ſufficiently guarded; and there he ſafely carried over his army.

96
Battle of Agincourt.

But the enemy was ſtill reſolved to intercept his retreat: and after he had paſſed the ſmall river of Tertrois at Blangi, he was ſurpriſed to obſerve from the heights the whole French army drawn up in the plains of Agincourt; and ſo poſted, that it was impoſſible for him to proceed on his march, without coming to an engagement. A battle accordingly took place, in which the Engliſh gained a victory, the moſt remarkable perhaps of any recorded in hiſtory; an account of which is given under the article AGINCOURT.

97
Henry lands again in Normandy.

This victory, gained on the 25th of October 1415, was however attended with no immediate effects. Henry ſtill continued to retreat, after the battle of Agincourt, out of the kingdom: and carried his priſoners to Calais, and from thence to England. In 1517, he once more landed an army of 25,000 men in Normandy; and prepared to ſtrike a deciſive blow for the crown of France, to which the Engliſh monarchs had long made pretenſions. That wretched country was now in a moſt deplorable ſituation. The whole kingdom appeared as one vaſt theatre of crimes, murders, injuſtice, and devaſtation. The duke of Orleans was aſſaſſinated by the duke of Burgundy: and the duke of Burgundy, in his turn, fell by the treachery of the dauphin. At the ſame time, the duke's ſon, deſirous of revenging his father's death, entered into a ſecret treaty with the Engliſh; and a league was immediately concluded at Arras, between Henry and the young duke of Burgundy, in which the king promiſed to revenge the murder of the late duke; and the ſon ſeemed to inſiſt upon no farther ſtipulations. Henry, therefore, proceeded in his conqueſts without much oppoſition from any quarter. Several towns and provinces ſubmitted on his approach; the city of Rouen was beſieged and taken: Pontoiſe and Giſors he ſoon became maſter of. He even threatened Paris by the terror of his power, and obliged the court to remove to Troye. It was at this city that the duke of Burgundy, who had taken upon him the protection of the French king, met Henry in order to ratify that treaty which was formerly begun, and by which the crown of France was to be transferred to a ſtranger. The imbecility into which Charles had fallen, made him paſſive in this remarkable treaty; and Henry dictated the terms throughout the whole negociation. The principle articles of this treaty were, That Henry ſhould eſpouſe the princes Catharine; that king Charles ſhould enjoy the title and dignity of king for life; but that Henry ſhould be declared heir to the crown, and ſhould be intruſted with the preſent adminiſtration of the government; that France and England ſhould for ever be united under one king, but ſhould ſtill retain their reſpective laws and privileges; that Henry ſhould unite his arms with thoſe of king Charles and the duke of Burgundy, to depreſs and ſubdue the dauphin and his partiſans.

98
He marries the princeſs Catharine.

It was not long after this treaty, That Henry married the princeſs Catharine; after which he carried his father-in-law to Paris, and took a formal poſſeſſion of that capital. There he obtained, from the eſtates of the kingdom, a ratification of the late compact; and then turned his arms with ſucceſs againſt the adherents of the dauphin; who, in the mean time, wandered about a ſtranger in his own patrimony, and to his enemies ſucceſſes only oppoſed fruitleſs expoſtulations.

Henry's ſupplies were not provided in ſuch plenty as to enable him to carry on the war, without returning in perſon to prevail upon his parliament for freſh ſuccours; and, upon his arrival in England, though he found his ſubjects highly pleaſed with the ſplendor of his conqueſts, yet they ſeemed ſomewhat doubtful as to the advantage of them. A treaty which in its conſequences was likely to transfer the ſeat of empire from England, was not much reliſhed by the parliament. They therefore, upon various pretences, refuſed him a ſupply equal to his exigencies or his demands; but he was reſolved on purſuing his ſchemes; and, joining to the ſupplies granted at home, the contributions levied on the conquered provinces, he was able once more to aſſemble an army of 28,000 men, and with theſe he landed ſafely at Calais.

In the mean time, the dauphin, a prince of great prudence and activity, omitted no opportunity of repairing his ruined ſituation, and to take the advantage of Henry's abſence from France. He prevailed upon the regent of Scotland to ſend him a body of 8000 men from that kingdom; and with theſe and ſome few forces of his own, he attacked the duke of Clarence, who commanded the troops in Henry's abſence, and gained a complete victory.

This was the firſt action which turned the tide of ſucceſs againſt the Engliſh. But it was of ſhort duration: for Henry ſoon after appearing with a conſiderable army, the dauphin fled at his approach; while many of the places which held out for the dauphin in the neighbourhood of Paris; ſurrendered to the conqueror. In this manner, while Henry was every where victorious, he fixed his reſidence at Paris; and while Charles had a ſmall court, he was attended with a very magnificent one. On Whitſunday 1421, the two kings and their two queens with crowns on their heads dined together in public; Charles receiving apparent homage, but Henry commanding with abſolute authority.

In the mean time, the dauphin was chaſed beyond the Loire, and almoſt totally diſpoſſeſſed of all the northern provinces. He was even purſued into the ſouth by the united arms of the Engliſh and Burgundians and threatened with total deſtruction. In this exigence, he found it neceſſary to ſpin out the war, and to evade all hazardous actions with a rival who had been long accuſtomed to victory. His prudence was every where remarkable; and after a train of long perſecutions from fortune, he found her at length willing to declare in his favour, by the death of the king of England.

99
Death of Henry and Charles VII.

Charles VI. died a ſhort time after; and Charles VII. ſucceeded his father to a nominal throne. Nothing could be more deplorable than the ſituation of that monarch on aſſuming his title to the crown. The Engliſh were maſters of almoſt all France; and Henry VI. though yet but an infant, was ſolemnly inveſted with regal power by legates from Paris. The duke of Bedford was at the head of a numerous army, in the heart of the kingdom ready to oppoſe every inſurrection; while the duke of Burgundy, who had entered into a firm confederacy with him, ſtill remained ſtedfaſt, and ſeconded his claims. Yet, notwithſtanding theſe favourable appearances, Charles found means to break the leagues formed againſt him, and to bring back his ſubjects to their natural intereſts and their duty.

100
Deſperate ſituation of Charl. VII.

However, his firſt attempts were totally deſtitute of ſucceſs. Wherever he endeavoured to face the enemy he was overthrown, and he could ſcarely rely on the friends next his perſon. His authority was inſulted even by his own ſervants; advantage after advantage was gained againſt him: and a battle fought near Verneuil, in which he was totally defeated by the duke of Bedford, ſeemed to render his affairs altogether deſperate. But from the impoſſibility of the Engliſh keeping the field without new ſupplies, Bedford was obliged to retire into England; and in the mean time, his vigilant enemy began to recover from his late conſternation. Dumois, one of his generals, at the head of 1000 men, compelled the earl of Warwick to raiſe the ſiege of Montargis; and this advantage, ſlight as it was, began to make the French ſuppoſe that the Engliſh were not invincible.

101
The French affairs retrieved by the Maid of Orleans.

But they ſoon had ſtill greater reaſon to triumph in their change of fortune, and a new revolution was produced by means apparently the moſt unlikely to be attended with ſucceſs. In the village of Domremi, near Vaucouleurs, on the borders of Lorrain, there lived a country girl, about 27 years of age, called *Joan de Arc*. This girl had been a ſervant at a ſmall inn; and in that humble ſtation had ſubmitted to thoſe hardy employments which fit the body for the fatigues of war. She was of an irreproachable life, and had hitherto teſtified none of thoſe enterpriſing qualities which diſplayed themſelves ſoon after. She contentedly fulfilled the duties of her ſituation, and was remarkable only for her modeſty and love of religion. But the miſeries of her country ſeemed to have been one of the greateſt objects of her compaſſion and regard. Her mind, inflamed by theſe objects, and brooding with melancholy ſtedfaſtneſs upon them, began to feel ſeveral impulſes, which ſhe was willing to miſtake for the inſpirations of heaven. Convinced of the reality of her own admonitions, ſhe had recourſe to one Baudricourt, governor of Vaucouleurs, and informed him of her deſtination by heaven to free her native country of its fierce invaders. Baudricourt treated her at firſt with neglect; but her importunities at length prevailed; and willing to make a trial of her pretenſions, he gave her ſome attendants, who conducted her to the court, which at that time reſided at Chinon.

The French court were probably ſenſible of the weakneſs of her pretenſions; but they were willing to make uſe of every artifice to ſupport their declining fortunes. It was therefore given out, that Joan was actually inſpired; that ſhe had been able to diſcover the king among the number of his courtiers although he had laid aſide all the diſtinctions of his authority; that ſhe had told him ſome ſecrets, which were only known to himſelf; and that ſhe had demanded, and minutely deſcribed, a ſword in the church of St Catharine de Fierbois, which ſhe had never ſeen. In this manner, the minds of the vulgar being prepared for her appearance, ſhe was armed cap-à-pee, and ſhown in that martial dreſs to the people. She was then brought before the doctors of the univerſity; and they tinctured with the credulity of the times, or willing to ſecond the impoſture, declared that ſhe had actually received her commiſſion from above.

When the preparations for her miſſion were completely blazoned, the next aim was to ſend her againſt the enemy. The Engliſh were at that time beſieging the city of Orleans, the laſt reſource of Charles, and every thing promiſed them a ſpeedy ſurrender. Joan undertook to raiſe the ſiege; and to render herſelf ſtill more remarkable, girded herſelf with the miraculous ſword, of which ſhe before had ſuch extraordinary notices. Thus equipped, ſhe ordered all the ſoldiers to confeſs themſelves before they ſet out; ſhe diſplayed in her hand a conſecrated banner, and aſſured the troops of certain ſucceſs. Such confidence on her ſide ſoon raiſed the ſpirits of the French army; and even the Engliſh, who pretended to deſpiſe her efforts, felt themſelves ſecretly influenced with the terrors of her miſſion. A ſupply of proviſions was to be conveyed into the town; Joan, at the head of ſome French troops, covered the embarkation, and entered Orleans at the head of the convoy, which ſhe had ſafely protected. While ſhe was leading her troops along, a dead ſilence and aſtoniſhment reigned among the Engliſh; and they regarded with religious awe that temerity, which they thought nothing but ſupernatural aſſiſtance could inſpire. But they were ſoon rouzed from their ſtate of amazement by a ſally from the town; Joan led on the beſieged, bearing the ſacred ſtandard in her hand, encouraging them with her words and actions, bringing them to the trenches, and overpowering the beſiegers.

gers in their own redoubts. In the attack of one of the forts, ſhe was wounded in the neck with an arrow; but inſtantly pulling out the weapon with her own hands, and getting the wound quickly dreſſed, ſhe haſtened back to head the troops, and to plant her victorious banner on the ramparts of the enemy. Theſe ſucceſſes continuing, the Engliſh found that it was impoſſible to reſiſt troops animated by ſuch ſuperior energy; and Suffolk, who conducted the attack, thinking that it might prove extremely dangerous to remain any longer in the preſence of ſuch a courageous and victorious enemy, raiſed the ſiege, and retreated with all imaginable precaution.

From being attacked, the French now in turn became the aggreſſors. Charles formed a body of 6000 men, and ſent them to beſiege Jergeau, whither the Engliſh, commanded by the earl of Suffolk, had retired, with a detachment of his army. The city was taken; Suffolk yielded himſelf a priſoner; and Joan marched into the place in triumph at the head of the army. A battle was ſoon after fought near Patay, where the Engliſh were worſted, as before; and the generals Scales and Talbot were taken priſoners.

The raiſing of the ſiege of Orleans was one part of the maid's promiſe to the king of France; the crowning him at Rheims was the other. She now declared that it was time to complete that ceremony; and Charles, in purſuance of her advice, ſet out for Rheims at the head of 12,000 men. The towns thro' which he paſſed opened their gates to receive him; and Rheims ſent him a deputation, with its keys, upon his approach. The ceremony of his coronation was there performed with the utmoſt ſolemnity; and the *Maid of Orleans* (for ſo ſhe was now called) ſeeing the completion of her miſſion, deſired leave to retire, alleging, that ſhe had now accompliſhed the end of her calling. But her ſervices had been ſo great, that the king could not think of parting with her; he preſſed her to ſtay ſo earneſtly, that ſhe at length complied with his requeſt.

102
Henry VI. of England crowned king of France.

A tide of ſucceſſes followed the performance of this ſolemnity; Laon, Soiſſons, Chatteau-Thierri, Provins, and many other fortreſſes in that neighbourhood, ſubmitted to him on the firſt ſummons. On the other hand, the Engliſh, diſcomfited and diſpirited, fled on every quarter; not knowing whether to aſcribe their misfortunes to the power of ſorcery or to a celeſtial influence; but equally terrified at either. They now found themſelves deprived of the conqueſts they had gained, in the ſame manner as the French had formerly ſubmitted to their power. Their own diviſions, both abroad and at home, unfitted them entirely for carrying on the war; and the duke of Bedford, notwithſtanding all his prudence, ſaw himſelf diveſted of his ſtrong-holds in the country, without being able to ſtop the enemy's progreſs. In order, therefore, to revive the declining ſtate of his affairs, he reſolved to have Henry crowned king at Paris, knowing that the natives would be allured to obedience by the ſplendor of the ceremony. In 1430, Henry was accordingly crowned, all the vaſſals that ſtill continued under the Engliſh power, ſwearing fealty and homage. But it was now too late for the ceremonies of a coronation to give a turn to the affairs of the Engliſh; the generality of the kingdom had declared againſt them, and the remainder only waited a convenient opportunity to follow the example.

103
Maid of Orleans taken priſoner.

An accident enſued ſoon after, which, though it promiſed to promote the Engliſh cauſe in France, in the end ſerved to render it odious, and conduced to the total evacuation of that country. The duke of Burgundy, at the head of a powerful army, had laid ſiege to Compeign; and the Maid of Orleans had thrown herſelf into the place, contrary to the wiſhes of the governor, who did not deſire the company of one whoſe authority would be greather than his own. The garriſon, however, were rejoiced at her appearance, and believed themſelves invincible under her protection. But their joy was of ſhort duration; for Joan having the day after her arrival headed a ſally, and twice driven the enemy from their intrenchments, ſhe was at laſt obliged to retire, placing herſelf in the rear, to protect the retreat of her forces. But in the end attempting to follow her troops into the city, ſhe found the gates ſhut, and the bridge drawn up by order of the governor, who is ſaid to have long wiſhed for an opportunity of delivering her up to the enemy.

Nothing could exceed the joy of the beſiegers, in having taken a perſon who had been ſo long a terror to their arms. The ſervice of Te Deum was publicly celebrated on this occaſion; and it was hoped, that the capture of this extraordinary perſon would reſtore the Engliſh to their former victories and ſucceſſes. The duke of Bedford was no ſooner informed of her being taken, than he purchaſed her of the count Vendome, who had made her his priſoner, and ordered her to be committed to cloſe confinement. The credulity of both nations was at that time ſo great, that nothing was too abſurd to gain belief that coincided with their paſſions. As Joan but a little before, from her ſucceſſes, was regarded as a ſaint, ſhe was now, upon her captivity, conſidered as a ſorcereſs, forſaken by the dæmon who had granted her a fallacious and temporary aſſiſtance. Accordingly it was reſolved in council to ſend her to Rouen to be tried for witchcraft: and the biſhop of Beauvais, a man wholly devoted to the Engliſh intereſt, preſented a petition againſt her for that purpoſe. The univerſity of Paris was ſo mean as to join in the ſame requeſt. Several prelates, among whom the cardinal of Wincheſter was the only Engliſhman, were appointed as her judges. They held their court at Rouen, where Henry then reſided; and the Maid, clothed in her former military apparel, but loaded with irons, was produced before this tribunal. Her behaviour there no way diſgraced her former gallantry; ſhe betrayed neither weakneſs nor womaniſh ſubmiſſion; but appealed to God and the pope for the truth of her former revelations. In the iſſue, ſhe was found guilty of hereſy and witchcraft; and ſentenced to be burnt alive, the common puniſhment for ſuch offences.

But previous to the infliction of this dreadful ſentence upon her, they were reſolved to make her abjure her former errors; and at length ſo far prevailed upon her, by terror and rigorous treatment, that her ſpirits were entirely broken by the hardſhips ſhe was obliged to ſuffer. Her former viſionary dreams began to vaniſh, and a gloomy diſtruſt to take place of her late inſpirations. She publicly declared herſelf willing to recant, and promiſed never more to give way to the vain deluſions which had hitherto miſled her, and impoſed on the people. This was what her oppreſſors deſired; and willing to ſhow ſome appearance of mercy, they changed her ſentence into perpetual impriſonment, and to be fed during life on bread and water. But the rage of her enemies was not yet ſatiated. Suſpecting that the female dreſs, which ſhe had conſented to wear, was diſagreeable to her, they purpoſely placed in her apartment a ſuit of mens apparel, and watched for the effect of their temptation upon her. Their cruel artifices prevailed. Joan, ſtruck with the ſight of a dreſs in which ſhe had gained ſo much glory, immediately threw off her penitent's robes, and put on the forbidden garment. Her enemies caught her equipped in this manner; and her imprudence was conſidered as a relapſe into her former tranſgreſſions. No recantation would ſuffice, and no pardon would be granted. She was condemned to be burnt alive in the market-place of Rouen; and this infamous ſentence was accordingly executed with moſt brutal ſeverity.

104
And cruelly put to death.

One of the firſt misfortunes which the Engliſh felt after this puniſhment, was the defection of the duke of Burgundy; who had for ſome time ſeen the error of his conduct, and wiſhed to break an unnatural connection, that only ſerved to involve his country in ruin. A treaty was therefore begun and concluded between him and Charles, in which the former agreed to aſſiſt him in driving the Engliſh out of France. This was a mortal blow to their cauſe; and ſuch was its effects upon the populace of London when they were informed of it, that they killed ſeveral of the duke of Burgundy's ſubjects, who happened to be among them at that time. It might perhaps alſo have haſtened the duke of Bedford's death, who died at Rouen a few days after the treaty was concluded; and the earl of Cambridge was appointed his ſucceſſor to the regency of France.

105
Affairs of the Engliſh totally ruined,

From this period, the Engliſh affairs became totally irretrievable. The city of Paris returned once more to a ſenſe of its duty. Lord Willoughby, who commanded it for the Engliſh, was contented to ſtipulate for the ſafe retreat of his troops to Normandy. Thus ground was continually, though ſlowly, gained by the French; and notwithſtanding their fields were laid waſte, and their towns depopulated, yet they found protection from the weakneſs and diviſions of the Engliſh. At length both parties began to grow weary of a war, which, though carried on but feebly, was yet a burden greater than either could ſupport. But the terms of peace inſiſted upon by both were ſo wide of each other, that no hopes of an accommodation could quickly be expected. A truce, therefore, for twenty-two months, was concluded in 1443, which left every thing on the preſent footing between the parties. No ſooner was this agreed upon, than Charles employed himſelf with great induſtry and judgment in repairing thoſe numberleſs ills to which his kingdom, from the continuance of wars both foreign and domeſtic, had ſo long been expoſed. He eſtabliſhed diſcipline among his troops, and juſtice among his governors. He revived agriculture, and repreſſed faction. Thus being prepared once more for taking the field, he took the firſt favourable occaſion of breaking the truce; and Normandy was at the ſame time invaded by four powerful armies; one commanded by Charles himſelf, a ſecond by the duke of Brittany, a third by the count of Alençon, and a fourth by the count Dunois. Every place opened its gates almoſt as ſoon as the French appeared before them. Rouen was the only one that promiſed to hold out a ſiege; but the inhabitants clamoured ſo loud for a ſurrender, that the duke of Somerſet, who commanded the garriſon, was obliged to capitulate. The battle, or rather the ſkirmiſh, of Fourmingi, was the laſt ſtand which the Engliſh made in defence of their French dominions. However, they were put to the rout, and above a thouſand were ſlain. All Normandy and Guienne, that had ſo long acknowledged ſubjection to England, were loſt in the ſpace of a year; and the Engliſh ſaw themſelves entirely diſpoſſeſſed of a country which for about three centuries they had conſidered as annexed to their native dominions. Calais alone remained of all their conqueſts; and this was but a ſmall compenſation for the blood and treaſure which had been laviſhed in that country, and only ſerved to gratify ambition with a tranſient applauſe.

106
Domeſtic misfortunes and death of Charles.

Thus, in the year 1450, the power of the Engliſh in France was entirely deſtroyed; and Charles deſervedly obtained the ſurname of *Victorious*, on account of the vigour he had ſhown in driving out the invaders of his country. His ſatisfaction, however, was now greatly diminiſhed by domeſtic misfortunes. The dauphin, forgetting the allegiance and filial duty he owed to his father, had already impeded his conqueſts by his ſeditious intrigues. He had uſed every endeavour to thwart the deſigns of his miniſters, and it was ſuppoſed that he had deſtroyed Agnes Soreille his father's favourite miſtreſs by poiſon. He had married Charlotte daughter to the duke of Savoy; which Charles had reſented by a declaration of war againſt the duke, but had been perſuaded to recall it in order to proſecute the war againſt Guienne, which made part of the dominions of the Engliſh. At laſt, weary of the diſobedience of his ſon, he commanded him to be arreſted; but Louis, informed of his deſign, withdrew to Franche Comte, and afterwards to Brabant; of which the duke of Burgundy (at this time ſovereign of the country) was no ſooner appriſed, than he ordered him to be ſupplied with every neceſſary, and treated with all imaginable reſpect. He refuſed to ſee him, however, until he ſhould obtain the approbation of his father; on which Louis, having in vain attempted to draw the duke into a participation of his crimes, employed himſelf in ſowing diſſenſion between his benefactor and his ſon the count of Charolois, at the very time that he himſelf was receiving a penſion of 12,000 crowns annually from the father. Thus he at laſt deſtroyed the domeſtic peace of his benefactor, while his unnatural behaviour created continual ſuſpicions in the mind of his father. Charles was repeatedly informed that his own domeſtics, along with his undutiful ſon, were in a conſpiracy againſt his life. The miſerable monarch, therefore, in continual fear of being poiſoned, and having none in whom he could repoſe any confidence, obſtinately refuſed for ſome days to take any nouriſhment; and when at laſt prevailed upon by the importunities of his attendants to do ſo, his ſtomach had become incapable of receiving food, ſo that he died for want of ſuſtenance in the year 1461. His body, neglected by his unnatural ſon, was interred at the expence

pence of Tannegui de Chaſtel, who had been his faithful companion.

107
Reign of Louis XI.

On the death of Charles, his ſon Louis ſucceeded to the throne, to which he had ſo long aſpired. He was reckoned one of the greateſt politicians that ever exiſted; though his character was not on that account the more amiable; on the contrary, there are few princes whoſe hiſtory appears in a more deteſtable light. So deſtitute was he of natural affection, that he did not even attempt to conceal his joy at his father's death. He pretended much friendſhip for the count of Charolois, ſon to the duke of Burgundy, on account of the protection he had received at his father's court; and even conferred upon him a penſion of 12,000 crowns annually: but all this ſhow of affection ſoon degenerated into a mortal averſion on both ſides. Some differences which took place between the courts of France and Caſtile produced an interview betwixt the two monarchs, Louis, and Henry ſurnamed the *Impotent*. They met at Mauleon on the confines of Navarre: but their negociations came to nothing, and they parted with a mutual contempt of each other: Henry deſpiſing the mean and ſordid appearance of Louis, as he in his turn did the gaudy magnificence of Henry. In his negociations with the duke of Burgundy, Louis proved more ſucceſsful; perſuading him to reſtore ſome towns on the river Somme, which had been ceded by Charles VII. and by the poſſeſſion of which the duke was in effect maſter of Picardy. This ceſſion was oppoſed by the count of Charolois; but Louis, by corrupting John de Croy the duke's miniſter, obtained his end; and for the ſum of 400,000 crowns the cities were delivered to him. By this tranſaction he effectually enſured the hatred of Charolois: and even in that very tranſaction the duplicity of Louis was eminently diſplayed; for though he had agreed to retain in thoſe towns the officers appointed by the duke, he was no ſooner in poſſeſſion of them than he diſplaced them all, and nominated others in their ſtead.

108
Formidable confederacy againſt Louis.

The duchy of Brittany was at this time governed by Francis, a weak but generous prince, and whoſe defect of capacity was ſupplied by the abilities of his miniſters. Him Louis inſulted in the moſt grievous manner; and as Francis found himſelf unable to oppoſe ſuch a powerful adverſary alone, he joined in a cloſe alliance with the duke of Burgundy and the count of Charolois; the latter having been grievouſly offended with Louis, and even accuſed him of attempting his life. The conſpiracy was joined by ſeveral of the principal French nobility, who had been oppreſſed by the king; and though the ſecret was confided to upwards of 500 perſons, not one of them ever divulged it. Louis finding matters become very critical, marched with an army towards the capital, which the count of Charolois already inſulted. A battle enſued, in which both princes exerted themſelves to the utmoſt, though their valour was but ill ſeconded by the bravery of their troops. About 1500 periſhed on each ſide; but the count of Charolois remained maſter of the field of battle. Louis, however, after this engagement, entered the capital; where he endeavoured by every kind of conceſſion he could think of, to conciliate the affection of his ſubjects; in which he ſucceeded ſo well, that though the army of inſurgents was ſoon augmented to more than 100,000 men, they were unable to make themſelves maſters of the city. At laſt a treaty was ſet on foot betwixt Louis and the count of Charolois; by which the latter obtained the towns which had been formerly ceded, with the diſtricts of Boulogne, Guiſne, Peronne, Mondidior, and Roye, as a perpetual inheritance for himſelf. By granting favours to the other confederates, the league was broken; and the moment that Louis found himſelf freed from danger, he proteſted againſt the whole treaty in preſence of ſome confidential members of parliament, as contrary to the intereſts of the crown; and therefore waited the firſt favourable opportunity to cruſh one by one thoſe who had been ready by their united efforts to deſtroy himſelf. The duke of Bourbon, one of the moſt able of the confederates, was gained over, by beſtowing upon him in marriage Jane the natural daughter of Louis himſelf, with the dowry of Uſſon in Auvergne; together with Moras, Beaurepaire, and Cormillon in Dauphiny; while, by the diſcontents betwixt the dukes of Brittany and Normandy, he was enabled to ſecure the neutrality of the former, and to recover from the latter ſome territories which he had unwillingly ceded to him.

109
Peace concluded.

110
Treachery of Louis.

In 1467, Philip duke of Burgundy, from his amaible qualities ſurnamed *The Good*, died, and left his dominions to his ſon Charles count of Charolois. That fiery and impetuous prince, jealous of the growing power of France, and an implacable enemy of Louis, had entered into a ſecret treaty with Francis; but Louis had driven the Britons from the poſts they occupied in Normandy before the duke of Burgundy could paſs the Somme. The king, however, alarmed at the power of the confederates, concluded a peace with Brittany; and, confiding in his talents for negociation, determined to have a perſonal interview with the duke of Burgundy.

111
Louis impriſoned by Charles.

This memorable interview took place in the year 1468; and Peronne, a city of Picardy, but belonging to the duke of Burgundy, was appointed as the place of rendezvous. To this place the politic Louis repaired with a ſlender train, and attended only by Cardinal Balue, the duke of Bourbon, and the count de St Pol, conſtable of France; ſeemingly without reflecting that he was entering an hoſtile city, where he might be confined for any length of time, or treated at the pleaſure of the duke, who was his mortal enemy. Indeed he had not long been in the place when he began to ſee the error of his conduct; and by the daily concourſe of Burgundian lords and other perſons of rank, who were his avowed enemies, he became alarmed for his perſonal ſafety. His fear now ſuggeſted to him a worſe meaſure than even the former; and he requeſted apartments in the caſtle, where it was in the power of his rival in a moment to make him a cloſe priſoner. This event accordingly took place, and that through the arts and machinations of Louis himſelf. His deſign had been from the beginning to keep the duke of Burgundy conſtantly employed in domeſtic wars. For this purpoſe he had, before his interview with Charles, excited the inhabitants of Liege, who were ſubject to the duke of Burgundy, to revolt. It is moſt probable, that he did not imagine the effects of this treachery would ſo ſoon begin to appear. At the very time, however, that Louis was

112
A treaty between Louis and Charles.

in the caſtle of Peronne, the people of Liege revolted, ſeized the biſhop and governor; and having maſſacred great numbers of the adherents of Charles, retired with the priſoners they had made to the capital. Charles was ſoon informed of this maſſacre, with the additional circumſtance, that the ambaſſadors of Louis were ſeen animating the inſurgents to their work of deſtruction. He then flew into a tranſport of rage; commanded the gates of the caſtle to be ſhut and ſtrictly guarded; denouncing the ſevereſt vengeance on the perfidious monarch who had ſo often deceived him. Louis, however, though greatly, and no doubt very juſtly, alarmed, did not neglect to take the proper methods for ſecuring himſelf. He diſtributed large ſums of money among thoſe officers to whom he imagined the duke was moſt inclined to pay any regard, and by ſplendid promiſes and preſents endeavoured to allay the reſentment of his other enemies. At laſt the reſentment of Charles having ſubſided, he entered into a treaty with the king, and concluded it upon much the ſame terms as thoſe which had been agreed upon before. His reſentment, however, ſtill manifeſted itſelf ſo far, that he inſiſted upon Louis being preſent at the puniſhment he inflicted upon the inhabitants of Liege for the maſſacre they had committed, and of which we have already taken notice. This was agreed to: the two princes formed the ſiege of the city in conjunction; and, notwithſtanding the obſtinate defence of the people, it was at laſt taken by ſtorm, and the inhabitants maſſacred. It was not long, however, before the new alliance was diſſolved. A confederacy againſt Louis, whom neither promiſes nor treaties could bind, was formed betwixt his own brother the duke of Normandy and the duke of Burgundy; but before their meaſures were ripe for execution, Louis had already commenced hoſtilities. The duke of Burgundy, as a peer of France, was ſummoned to parliament; and on his refuſal, the conſtable St Pol made himſelf maſter of St Quintin. Several other cities were ſoon after reduced; and Baldwin, the natural brother of Charles, corrupted by Louis, deſerted his cauſe; and the haughty ſpirit of the duke was thus at laſt obliged to condeſcend to ſolicit a peace. This, however, was of no long duration. Charles, encouraged by the ſucceſs of Edward IV. of England his brother-in-law, began once more to league againſt Louis with the dukes of Brittany and of Guienne; the latter being the king's brother, formerly duke of Normandy, but who had exchanged that duchy for the territory of Guienne. But while the affairs of the confederates ſeemed to be in a proſperous way, their proſpects were ſuddenly overcaſt by the death of the duke of Guienne, which was univerſally ſuppoſed to have been occaſioned by poiſon, and Louis was as univerſally looked upon as the author. The abbot of St Joan d'Angeli was fixed upon as the immediate perpetrator of the deed: but on the day appointed for his trial he was found ſtrangled in his cell; and this alſo was with great probability ſuppoſed to have been the deed of Louis, who after the death of his brother inſtantly ſeized on the territory of Guienne, and annexed it to the dominions of France.

113
Furious invaſion of France by Charles of Burgundy.

114
Invaſion by Edward IV. of England.

115
Louis agrees to pay an annual penſion to Edward.

By this unheard of conduct of the French monarch, Charles was exaſperated to ſuch a degree, that he vowed the moſt dreadful vengeance againſt the unhappy people of France, and threatened to ſacrifice to the memory of the duke of Guienne every one who now fell into his hands. The citizens of Neſle were maſſacred without diſtinction of ſex or age; Beauvais reſiſted his attacks; after which Charles wreaked his fury on other places. Having entered the country of Caux, he reduced the cities of Eu and St Valery, burnt Longueville, and waſted the whole country as far as Rouen. Louis, on the other hand, ſteady and conſtant in his deſigns, determined to diſſolve the league between the duke of Brittany and Edward IV. of England. Accordingly he encamped with his army on the frontiers of Brittany; while the duke, not meeting with the aſſiſtance promiſed by Edward, was obliged to conſent to a truce for a year; and the duke of Burgundy himſelf was obliged to follow his example, having committed ſuch devaſtations as deprived him of all means of ſubſiſtence in the country, ſo that he could neither advance nor retreat. In a very little time, however, he again began to conſpire with the king of England againſt Louis, and a powerful invaſion was determined upon. Edward was to croſs the ſea with an army of 10,000 men, while Charles aſſembled all his forces to join him. The former was alſo to ſet up a claim to the crown of France, and at leaſt to obtain the provinces of Normandy, and Guienne; the duke was to have Champagne with ſome adjacent diſtricts; to free his dominions from homage; and neither party was to make peace without the conſent of the other. It was ſuppoſed that the duke of Brittany would naturally accede to the confederacy; and the count de St Pol, conſtable of France, had engaged to deliver up the town of St Quintin and others which he occupied on the river Somme. Louis, however, ſtill had the good fortune to avoid the ſtorm. Charles, inſtead of advancing to the aſſiſtance of Edward, who had entered France at the head of 15,000 archers and 1500 men at arms, laid ſiege to the city of Nuiz on the Rhine; while the conſtable St Pol, inſtead of delivering up the towns as he had promiſed, deceived his allies, and enabled Louis to diſſolve a confederacy, which, had it been vigorouſly maintained, might have involved him in the greateſt difficulties. To procure the departure of Edward, however, he was obliged to conſent to a tribute of 75,000 crowns, as well as to ſettle on the king himſelf 50,000 crowns for life: betrothing alſo the dauphin to the eldeſt daughter of the king of England. The duke of Burgundy exclaimed loudly againſt this treaty: But Edward perſiſted in his reſolution; and it was accordingly executed at a place called *Pecquigny*, near Amiens; but in ſuch a manner as ſhowed the little confidence the two ſovereigns repoſed in each other. A grated barrier was erected in the middle of the bridge of Pecquigny, between the barriers of which only a man's arm could paſs: the two princes appeared on the oppoſite ſides of it; and having conferred privately, and confirmed the treaty between them, parted with many proteſtations of friendſhip; in which, probably, neither party was very ſincere. A power was reſerved by Edward, for the duke of Burgundy to accede to the treaty; but the latter haughtily replied, that he was able to ſupport himſelf without the aſſiſtance of England; and that he would make no peace with Louis till three months after the return of Edward to his own country. To this reſolution he adhered ; but no ſooner was the term expired, than he concluded a truce with Louis for nine years. The ſtipulations publicly agreed upon betwixt theſe two princes, conſiſted only in ſome articles for the mutual advantage of their ſubjects ; but privately they had ſigned others of a different nature. The conſtable St Pol having rendered himſelf obnoxious to all parties by his complicated treachery, fled to Mons in Hainault ; but the duke of Burgundy had already conſented to deliver him up on condition of receiving his eſtates and moveables as the price of his treachery.

Thus was Louis, without any other remarkable qualification than the mere arts of falſehood and duplicity, got rid of all his enemies except the duke of Burgundy, whoſe growing power rendered him a conſtant object of jealouſy and terror.

116 Charles engages in a war with the Swiſs.

His own imprudence and raſhneſs, however, ſoon proved his ruin. Having raſhly engaged in a war with the Swiſs, he was defeated in the firſt engagement with that martial nation, with the loſs of his military cheſt and baggage, with his plate and jewels, ſuppoſed to be the richeſt in Europe. His diſappointment on this occaſion was ſo great, that he was ſeized with a ſevere ſickneſs, from which he had hardly recovered, when he reſumed his mad ſcheme of conquering the Swiſs. Another battle enſued ; in which, after an obſtinate diſpute, Charles was defeated with the loſs of 18,000 men, himſelf eſcaping with great difficulty. This diſaſter was followed by the defection of moſt of his allies : the duke of Lorrain recovered the city of Nancy, and great part of his dominions which Charles had ſeized ; while the latter, overwhelmed with ſhame and diſappointment, ſpent his time in ſolitude and inactivity. From this he was at laſt rouſed by the misfortunes which fell upon him in ſuch quick ſucceſſion. He now inveſted the city of Nancy ; and in this, as well as in every other inſtance, he acted againſt the advice of his beſt officers ; and the conſequences were ſtill more fatal than before.—The duke of Lorrain advanced with a ſtrong body of Germans to the relief of the city, while Charles had ſcarcely 4000 men to oppoſe him. His troops were therefore eaſily defeated, and himſelf, notwithſtanding the moſt heroic efforts of valour, hurried away in the crowd. The count de Campobaſſo, an Italian nobleman, in whom he put a great deal of confidence, but who was in reality a traitor, had deſerted with about 80 men in the beginning of the engagement.

116 He is aſſaſſinated.

He left 12 or 15 men about the duke's perſon, with ſtrict orders to aſſaſſinate him in the tumult ; and this order they punctually complied with ; the body of Charles being found two days after the battle, pierced with three wounds.

The news of Charles's death was received with the moſt unfeigned joy by Louis, whoſe ſole object now was to unite the territories of the duke of Burgundy, to his own.

118 Conqueſt of Burgundy by Louis.

This might be done in two ways ; one by a match between the dauphin and Mary the heireſs of Burgundy ; the other, by marrying her to the duke of Angouleme, a prince of the royal blood of France, and on whom Mary had ſhown ſome inclination to beſtow herſelf. The king, however, to whom duplicity and falſehood ſeem to have been abſolutely neceſſary, choſe a third method, more agreeable to his character. The match with the dauphin was attended with ſuch circumſtances as rendered it evidently impracticable. The diſparity of age was very great, the dauphin being only eight years old, and the princeſs twenty ; the Flemings were beſides very much averſe from ſubmitting to a prince whoſe powerful reſources would enable him to oppreſs their liberties : but, notwithſtanding theſe inſurmountable difficulties, Louis choſe to inſiſt upon the match, at the ſame time that he endeavoured to make himſelf maſter of her dominions by force of arms. He addreſſed circular letters to the principal cities of Burgundy ; repreſenting, that the duchy had been given by king John to the male heirs of his ſon Philip ; and that now, when theſe were extinct by the death of Charles, the territory reverted of courſe to the crown. To render this argument more effectual, he corrupted the governors of ſome towns, ſeduced the inhabitants of others to riſe againſt their governors ; whilſt he himſelf, at the head of an army, prepared to enforce obedience from thoſe who could not be worked upon by other methods. Thus the province of Burgundy was entirely reduced ; but Flanders could not be brought under ſubjection either by fair means, force, or fraud. In his conduct for this purpoſe, indeed, Louis diſplayed the moſt deteſtable, as well as the meaneſt, treachery and falſehood. To render Mary odious to her ſubjects, he negociated with her miniſters, and prevailed upon them to diſcloſe to him ſome of the moſt important ſtate ſecrets ; after which, he communicated their letters to the ſtates of Flanders. This double treachery, however, did not at preſent anſwer his purpoſe. The two miniſters whom he had betrayed, were indeed put to death without mercy, and that even in the preſence of their ſovereign ; but Mary herſelf was thus induced to beſtow herſelf upon the emperor Maximilian ; and Louis had the mortification to find, that all his arts had contributed only to aggrandize a rival power, whom he had already ſufficient cauſe to dread. To remedy this overſight, he entered into an alliance with Edward IV. of England, whom he had inſpired with a jealouſy of his brother Clarence, in order to prevent a match between that nobleman and the princeſs Mary, which had alſo been in agitation. Thus a peace was concluded between the two monarchs, to continue during the life of each, and for a year after.

The marriage of Mary with Maximilian effectually ſecured the independence of Flanders ; while the return of the prince of Orange to the party of that princeſs, extended the flames of war once more to the cities of Burgundy. The French were on the point of being totally expelled from that country, when Maximilian unexpectedly made propoſals of peace. A truce was on this concluded between the two princes ; but without any term limited for its duration, or without any conditions ſtipulated in favour of the Burgundians ; ſo that the whole country was quickly after reduced by Louis.

119 Tyranny and cruelty of Louis.

The king now, freed from the apprehenſion of foreign enemies, turned his vindictive diſpoſition againſt his own ſubjects ; over whom, under pretence of former rebellions, he exerciſed the moſt inſupportable tyranny. The principal victim to his ſanguinary diſpoſition on this occaſion was James d'Armagnac, duke of Nemours, one of the firſt noblemen in the kingdom, but who had formerly appeared a zealous confederate againſt him in the league in which Edward and Charles were concerned. The unfortunate nobleman, knowing that vengeance was determined againſt him, fled to a fortreſs named *Carlat*, ſituated among the mountains of Auvergne. Here he was beſieged by the ſeigneur de Beaujeu, who had married Anne the daughter of Louis. The place, however, was almoſt impregnable to any force; ſo that his enemies were obliged to make the moſt ſolemn promiſes of ſafety in order to induce him to ſurrender himſelf. By theſe he was at laſt perſuaded to truſt himſelf in the hands of the faithleſs tyrant; who no ſooner had him in his power than he ſhut him up in the Baſtile in an iron cage, and reprimanded the judges becauſe they had releaſed him from this cloſe confinement during the time of his examination. The judges reluctantly condemned him to be beheaded: but the king's cruelty extended beyond the ſentence; and he ordered the two young ſons of the duke, though yet in early childhood, to be placed directly under the ſcaffold, that they might be covered with the blood of their father. Four thouſand perſons are ſuppoſed to have periſhed upon this occaſion without any form of trial: and were it not for the concurrent teſtimony of the hiſtorians of that age, the inhumanities and barbarities of this monarch are ſcarce to be credited. By theſe he broke the ſpirits of the French nobility, and gradually extended the power of the crown beyond all bounds; ſo that at laſt it was limited only by the ſovereign's pleaſure. Amidſt all the perfidy and cruelty, however, for which this monarch is ſo juſtly to be deteſted, we may on ſome occaſions remark a kind of magnanimity and generoſity, which we cannot but applaud. An inſtance of this was his ſupporting the houſe of Medici againſt pope Sextus, whom he obliged to deſiſt from his attacks, and to recall his ſentence which he had fulminated againſt them.

120
Burgundy unſucceſsfully invaded by Maximilian.

In 1479, the emperor Maximilian, who had lightly abandoned the duchy of Burgundy when he might have reduced it, now renewed his claims when it was no longer in his power to enforce them. After a variety of actions of leſſer note, and the deſtruction of cities on both ſides, a deciſive battle was fought at Guinegate. Here the Flemings were routed; but as the French purſued with too great ardour, the infantry of the enemy rallied, and the battle was renewed with great ſlaughter on both ſides. A more deciſive advantage was afterwards gained by the capture of 80 Flemiſh veſſels, which induced that commercial people to think of peace. In the mean time, however, Louis, after a life ſpent in continual deceit, hypocriſy, and cruelty, received warning of his approaching end by a fit of apoplexy with which he was ſeized in the year 1480. He lay ſpeechleſs and motionleſs for two days; after which he recovered in ſome degree, but never completely regained his health and ſtrength. His illneſs, however, neither prevented him from purſuing the ſchemes of his ambition, nor from uſing the ſame methods as before to attain them. He ſeized, without any pretence, the eſtates of the duke of Bourbon, the only nobleman in the kingdom whoſe power could give him any cauſe of ſuſpicion; yet, notwithſtanding his aſſiduity for the intereſt of the dauphin, he kept him a kind of priſoner in the caſtle of Amboiſe, permitting none but his own ſervants, or perſons of the meaneſt rank, to have acceſs to him. He baniſhed his own conſort, the mother of the dauphin, to Savoy, and endeavoured to inſpire the prince with averſion towards her. By the death of Charles, the titular king of Naples, and the laſt of the ſecond houſe of Anjou, he became maſter of the county of Provence; but his ſatisfaction on this occaſion was marred by a ſecond ſtroke of apoplexy. Still, however, he revived, and, with his recovery, again began to purſue his ambitious intrigues. The death of Mary of Burgundy, who periſhed by a fall from her horſe, inſpired him with new views; and he betrothed his ſon to the infant daughter of the emperor. Thus he offended Edward IV. of England, whoſe eldeſt daughter Elizabeth had been previouſly contracted to the dauphin; and a war would have undoubtedly enſued, had it not been for the death of the king of England.

121
Death of Louis XI.

This was followed in no long time after by that of Louis himſelf, who had in vain exhauſted the ſkill of the phyſician, and wearied the clerical order with prayers and proceſſions to avert the impending ſtroke. He expired in the year 1483, after a reign of 23 years; during which he was deteſted by his ſubjects, whom he had continually oppreſſed; and equally dreaded and hated by his neighbours, whom he had conſtantly deceived; notwithſtanding which he obtained the title of *Moſt Chriſtian* from his holineſs which his ſucceſſors have ever after retained.

Notwithſtanding the dark character of this prince, it is undoubtedly to be allowed, that he laid the foundations of the future greatneſs of France. By his arts he deprived the common people of their liberty, depreſſed the power of the nobility, eſtabliſhed a ſtanding army, and even induced the ſtates to render many taxes perpetual, which formerly were only temporary, in order to ſupport the army which was to keep themſelves in ſlavery. From this time the people were accuſtomed to ſubmit entirely to the voice of their ſovereign as their only legiſlator; and being always obedient in matters of the greateſt conſequence, they cheerfully contributed whatever ſums were required to fulfil the king's pleaſure.

122
Reign of Cha. VIII.

Charles VIII. who ſucceeded his father Louis XI. in 1483, was only 14 years of age at the time of his father's death: but though he might, even at that age, have aſcended the throne without any material violation of the laws of France, yet it was judged neceſſary to have a regent on account of the king's delicacy of conſtitution and want of education. Three competitors appeared as candidates for this important truſt, *viz.* John duke of Bourbon, a prince of the blood, and who had, till the age of 60, maintained the moſt unblemiſhed character; Louis duke of Orleans, preſumptive heir to the crown, but who, from his being only 20 years old himſelf, ſeemed incapacitated on that account from undertaking ſuch an important office: the third competitor was Anne, the eldeſt daughter of Louis, to whom the latter had in the laſt moments of his life committed the charge of the kingdom, with the title of governeſs.

123
Regency of the Lady Beaujeu.

The claim of this lady was ſupported by the aſſembly of the ſtates-general at Tours; and though ſhe was only entered in the 22d year of her age, it appears that the office could not have been more properly beſtowed. Being married to Peter of Bourbon, ſire of Beaujeu,
her

her preſent title was *the Lady of Beaujeu*; but ſhe appears to have acted entirely independent of her huſband, who was but of a moderate capacity, and indeed had been recommended to her by Louis on account of his ſlender abilities, leſt by any other match the houſe of Bourbon ſhould be too much aggrandized. Her firſt ſtep was to ingratiate herſelf with the people by ſome popular acts: among which one was to puniſh the inſtruments of her father's cruelties. One of theſe, named Oliver le Dain, who, from the ſtation of a barber, had raiſed himſelf to the confidence and favour of the king, and had diſtinguiſhed himſelf by the invention of new modes of torture, was publicly hanged. Another, named Jean Doyac, who by continual acts of violence and rapacity had oppreſſed the people, was condemned, after, being whipped in all the open places or ſquares of Paris, to have one of his ears cut off, and his tongue pierced with a hot iron: after which he was conveyed to his native city of Montferrand, where he was again whipped, and his other ear cut off; after which his eſtates, as well as thoſe of Oliver, were confiſcated. Jacques Coitier, the phyſician of Louis, who had availed himſelf of the terror of death with which the king was ſtrongly influenced, to extort great ſums of money from him, was ordered to anſwer for the immenſe wealth he had acquired: but he averted the danger by paying a fine of 50,000 crowns.

Thus the lady de Beaujeu gained the affection of the people at large; and was equally ſucceſsful, in gaining over thoſe who were averſe to her government. The duke of Bourbon was made conſtable, an office which he had long deſired; but the duke of Orleans behaved in ſuch a manner as to exclude all hopes of favour. Incenſed at the determination of a trifling diſpute at tennis againſt him by the lady Beaujeu, he exclaimed, that whoever had decided it in that manner "was a liar if a man, or a ſtrumpet if a woman." After this furious declaration he fled to the caſtle of Beaujency, where, however, he was ſoon forced to ſurrender. He then applied to Henry VII. of England, who had newly aſcended the throne of England; but that prince, naturally ſlow and cautious, did not pay much attention to his propoſals; on which he next made his application to the court of Brittany.

124
Duke of Orleans flies to Brittany.

Here he was received with great marks of eſteem, and began to entertain hopes of marrying the daughter of the duke: but being looked upon with a jealous eye by the nobility, they entered into ſecret negociations with Anne, and even ſolicited her to invade the country. In theſe negociations, however, they ſtipulated that only a certain number of troops ſhould enter the province, and that no fortified place ſhould remain in the hands of the French: which conditions were indeed agreed to by the regent, though ſhe determined to keep them no longer than it anſwered her purpoſe.

125
That country invaded by the French.

In purſuance of this reſolution, Brittany was invaded at once by four armies, each of them ſuperior to the ſtipulated number, who quickly made themſelves maſters of the moſt important places in the country; while the troops of the duke retired in diſguſt, leaving them to purſue their conqueſts as they pleaſed. Finding at laſt, however, that the entire ſubjection of their country was determined upon, the nobility began to exert themſelves in defence of it; and, enflamed by the enthuſiaſm of liberty, they raiſed an army of 60,000 men. By theſe the French were compelled to abandon the ſiege of Nantz: but this proved only a tranſient gleam of ſucceſs. Anne perſevered in her deſign of completing the conqueſt of the country, and the ſtate of Europe at that time favoured the deſign. Of all the European ſtates, England alone was then capable of affording any effectual aſſiſtance; and the ſlow caution of Henry prevented him from giving the aſſiſtance which for his own intereſt he ought to have done. Thus the Bretons were left to defend themſelves the beſt way they could; and having ventured a battle, they were entirely defeated, and moſt of their leaders taken priſoners. A ſmall body of Engliſh, under the command of lord Woodville, who aſſiſted them, were entirely cut in pieces. The duke ſoon after died by a fall from his horſe, leaving his dominions to his daughter Anne, at that time only 13 years of age. A marriage was negociated betwixt the princeſs and Maximilian king of the Romans, who had been married to Mary of Burgundy; but by reaſon of the poverty of that prince it was never completed.

172
Marriage between the king of France and the ducheſs of Brittany.

The lady Beaujeu, then finding that the abſolute conqueſt of Brittany would ſtill be a difficult matter, determined to conclude a marriage betwixt the young king of France and the ducheſs, though the former had already been married to Margaret of Auſtria, the daughter of Maximilian. This marriage indeed had not been conſummated by reaſon of the tender age of the princeſs; but ſhe had been ſent to Paris for her education, and had for ſeveral years been treated as queen of France. In 1491, however, Margaret was ſent back to her father: Anne of Brittany for a long time refuſed to violate the engagements into which ſhe had entered; but at laſt, finding herſelf diſtreſſed on all ſides, and incapable of reſiſting the numerous forces of France with which ſhe was preſſed, ſhe reluctantly conſented to the match, and the nuptials were celebrated the ſame year at Langeais in Touraine.

Maximilian, whoſe poverty had prevented him from giving any aſſiſtance to his bride, or even from coming to ſee her, enraged at the double diſgrace he had ſuffered, began, when too late, to think of revenge. France was now threatened with an invaſion from the united forces of Auſtria, Spain, and England. But this formidable confederacy was ſoon diſſipated. Henry whoſe natural avarice had prevented him from giving the neceſſary aſſiſtance, was bought off with money: the immediate payment of 145,000 crowns, and the promiſe of 25,000 annually ever after, perſuaded him to retire into his own country. Ferdinand king of Spain had the countries of Rouſſillon and Cerdagne reſtored to him; while Maximilian was gratified by the ceſſion of part of Artois, which had been acquired by Louis XI.

127
His expedition into Italy, and ſurpriſing ſucceſs.

The young king of France agreed to theſe terms the more readily, that he was impatient to undertake an expedition into Italy, in order to conquer the kingdom of Naples, to which he claimed a right. Moſt of his counſellors were againſt the expedition; but the king was inflexible, even though Ferdinand king of Naples offered to do homage for his kingdom, and pay him a tribute of 50,000 crowns a year. He appointed Peter duke of Bourbon regent in his abſence; after which he ſet out on his expedition with very few troops and very little money. By the way he fell ill of the ſmall-pox, but in a ſhort time recovered, and entering Italy with only 6000 horſe and 12,000 foot, he was attended with the moſt ſurpriſing ſucceſs, traverſing the whole country in ſix weeks, and becoming maſter of the kingdom of Naples in leſs than a fortnight. Such extraordinary good fortune ſeemed miraculous; and he was reckoned an inſtrument raiſed up by God to deſtroy the execrable tyrants with which Italy was at that time infeſted. Had Charles made uſe of this prepoſſeſſion in his favour, and acted up to the character generally given him, he might have raiſed his name as high as any hero of antiquity. His behaviour, however, was of a very different nature. He amuſed himſelf with feaſts and ſhows; and leaving his power in the hands of favourites, they abandoned it to whoever would purchaſe titles, places, or authority, at the rates they impoſed; and the whole force he propoſed to leave in his new conquered dominions amounted to no more than 4000 men.

But while Charles was thus loſing his time, a league was concluded againſt him at Venice; into which entered the pope, the emperor Maximilian, the archduke Philip, Ludowic Sforza, and the Venetians. The confederates aſſembled an army of 40,000, men, commanded by Francis marquis of Mantua; and they waited for the king in the valley of Farnova, in the duchy of Parma, into which he deſcended with 9000 men. On the 6th of July 1495 he attacked the allies; and, notwithſtanding their great ſuperiority, defeated them, with the loſs of only 80 of his own men. Thus he got ſafe to France; but his Italian dominions were loſt almoſt as ſoon as he departed. Some ſchemes were propoſed for recovering theſe conqueſts; but they were never put in execution, and the king died of an apoplexy in 1498.

128
His death.

The premature death of this monarch, in the 28th year of his age, was ſuppoſed to have been owing to his irregular life, and particularly his attachment to women; which had for ſome time impaired his health, and brought on evident ſymptoms of his approaching diſſolution. At laſt he relinquiſhed his irregularities, and retired with the queen to the caſtle of Ambloiſe. Here in paſſing through a low door he ſtruck his head with violence againſt the top. No unfavourable ſymptom appeared at the time; but ſoon afterwards, as he converſed with his confeſſor, and avowed his deſign of obſerving the nuptial fidelity he owed to the queen, he ſuddenly fell backwards in a fit of apoplexy. He recovered his voice three times, and uttered ſome expreſſions of devotion; but inſtantly relapſed, and in a ſhort time expired, notwithſtanding every aſſiſtance that cold be given. He was greatly celebrated for his ſweet temper and agreeable diſpoſition, which procured him the ſurnames of the *Affable* and *Courteous*. Two of his domeſtics are ſaid to have died of grief after his death, and his widow abandoned herſelf to the moſt pungent ſorrow for *two days*.

By the death of Charles VIII. the throne of France paſſed from the direct line of the houſe of Valois, and Louis duke of Orleans ſucceeded to the throne. At the time of his acceſſion he was in his 36th year, and had long beeen taught prudence in the ſchool of adverſity. During the adminiſtration of the Lady Beaujeu, he had been, as we have already obſerved, conſtantly in diſgrace; and after his connections with the duke of Brittany, had ſpent a very conſiderable time in priſon; and though afterwards ſet at liberty by Charles, he had never poſſeſſed any ſhare of that monarch's confidence or favour. Towards the concluſion of that reign, he fell under the diſpleaſure of the queen: and had afterwards continued at his caſtle of Blois till he was called from thence to the poſſeſſion of the kingdom. He had been married in early life, and againſt his will, to Jane the youngeſt daughter of Louis XI. a princeſs of an amiable diſpoſition, but deformed in her perſon, and ſuppoſed to be incapable of bearing children. Afterwards he entertained thoughts of having this marriage diſſolved, and was ſuppoſed to poſſeſs the affection of the dutcheſs of Brittany before ſhe became queen of France. After the death of her huſband, that princeſs retired to Brittany, where ſhe pretended to aſſume an independent ſovereignty; but Louis having got his marriage with Jane diſſolved by Pope Alexander VI. quickly after made propoſals to the queen-dowager, which on her part were accepted without heſitation; though it was ſtipulated, that if ſhe ſhould have two ſons, the younger ſhould inherit the duchy of Brittany.

129
Expedition of Louis XII. into Italy.

As Louis while duke of Orleans, had ſome pretenſions to the kingdom of Naples, he inſtantly ſet about realizing them by conqueſt. On this acceſſion, he found matters in that country much more favourable to his deſigns than formerly. The pope, Alexander VI. was very much in his intereſts, from the hopes of getting his ſon Cæſar Borgia provided for; he had conciliated the friendſhip of the Venetians by promiſing them a part of the Milaneſe; he concluded a truce with the archduke Philip; and renewed his alliances with the crowns of England, Scotland and Denmark. He then entered Italy with an army of 20,000 men; and being aſſiſted by the Venetians, quickly conquered one part of the duchy, while they conquered the other, the duke himſelf being obliged to fly with his family to Inſpruck. He then attacked Ferdinand of Spain with three armies at once, two to act by land, and one by ſea; but none of theſe performing any thing remarkable, he was obliged to evacuate the kingdom of Naples in 1504.

In 1506, the people of Genoa revolted; drove out the nobility; choſe eight tribunes; and declared Paul Nuova, a ſilk-dyer, their duke: after which, they expelled the French governor, and reduced a great part of the Riviera. This occaſioned Louis's return into Italy; where, in 1507, he obliged the Genoeſe to ſurrender at diſcretion: and, in 1508, entered into the league of Cambray, with the other princes who at that time wanted to reduce the overgrown power of the Venetians. Pope Julius II. who had been the firſt contriver of this league, very ſoon repented of it: and declared, that if the Venetians would reſtore the cities of Faenza and Rimini, which had been unjuſtly taken from him, he would be contented. This was refuſed; and in 1509, the forces of the republic received ſuch an entire defeat from Louis, that they agreed to reſtore not only the two cities demanded by pope Julius, but whatever elſe the allies required.

The pope now, inſtead of executing his treaties with his allies, made war on the king of France without the leaſt provocation. Louis called an aſſembly of his clergy; where it was determined, that in ſome caſes it was lawful to make war upon the pope; upon which the king declared war againſt him, and committed the care of his army to the Marſhal de Trivulce. He ſoon obliged the pope to retire into Ravenna; and in 1511, Gaſton de Foix, duke of Nemours, gained a great victory at Ravenna, but was himſelf killed in the engagement. After his death the army diſbanded for want of pay; and the French affairs in Italy, and every where elſe, fell into great confuſion. They recovered the duchy of Milan, and loſt it again in a few weeks. Henry VIII. of England invaded France, and took Terruenne and Tournay; and the Swiſs invaded Burgundy with an army of 25,000 men. In this deſperate ſituation of affairs the queen died, and Louis put an end to the oppoſition of his moſt dangerous enemies by negociating marriages. To Ferdinand of Spain he offered his ſecond daughter for either of his grandſons, Charles or Ferdinand; and to renounce, in favour of that marriage, his claims on Milan and Genoa. This propoſal was accepted; and Louis himſelf married the princeſs Mary, ſiſter to Henry VIII. of England. This marriage he did not long ſurvive, but died on the 2d of January 1514; and was ſucceeded by Francis I. count of Angouleſme, and duke of Bretagne and Valois.

130 His marriage with the princeſs Mary of England, and death.

131 Francis I. invades Italy.

The new king was no ſooner ſeated on the throne, than he reſolved on an expedition into Italy. In this he was at firſt ſucceſsful, defeating the Swiſs at Marignano, and reducing the duchy of Milan. In 1518, the emperor Maximilian dying, Francis was very ambitious of being his ſucceſſor, and thereby reſtoring to France ſuch a ſplendid title, which had been ſo long loſt. But Maximilian, before his death, had exerted himſelf ſo much in favour of Charles V. of Spain, that Francis found it impoſſible to ſucceed; and from that time an irreconcileable hatred took place between the two monarchs. In 1521, this ill-will produced a war; which, however, might perhaps have been terminated, if Francis could have been prevailed upon to reſtore the town of Fontarabia, which had been taken by his admiral Bonivet: but this being refuſed, hoſtilities were renewed with greater vigour than ever; nor were they concluded till France was brought to the very brink of deſtruction. The war was continued with various ſucceſs till the year 1524; when Francis having invaded Italy, and laid ſiege to Pavia, he was utterly defeated before that city, and taken priſoner on the 24th of February.

132 Defeated and taken priſoner,

This diſaſter threw the whole kingdom into the utmoſt confuſion. The Flemiſh troops made continual inroads; many thouſand boors aſſembled in Alſace, in order to make an invaſion from that quarter; Henry VIII. had aſſembled a great army, and threatened the kingdom on that ſide alſo; and a party was formed in the kingdom, in order to diſpoſſeſs the ducheſs of the regency, and confer it on the duke de Vendoſme. This prince, however, who, after the conſtable, was the head of the Houſe of Bourbon, went on purpoſe to Lyons, where he aſſured the regent that he had no view but for her ſervice, and that of his country; upon which ſhe formed a council of the ableſt men of the kingdom, and of this ſhe made him preſident. The famous Andrew Doria ſailed with the French galleys to take on board the remainder of the French troops under the duke of Alva, whom he landed ſafely in France. Thoſe who eſcaped out of the Milaneſe alſo made their way back again as well as they could. Henry VIII. under the influence of cardinal Wolſey, reſolved not to oppreſs the oppreſſed: he therefore aſſured the regent that ſhe had nothing to fear from him; and at the ſame time adviſed her not to conſent to any treaty by which France was to be diſmembered. To the emperor, however, he uſed another language. He told him, that the time was now come when this puiſſant monarchy lay at their mercy; and therefore, that ſo favourable an opportunity ſhould not be let ſlip: that, for his part, he ſhould be content with Normandy, Guienne, and Gaſcony, and hoped the empire would make no ſcruple of owning him king of France: adding, that he expected the emperor would make a right uſe of his victory, by entering Guienne in perſon; in which caſe he was ready to bear half the expences of the war. He foreſaw what fell out: the emperor was alarmed at theſe conditions, and did not care to have him for a neighbour; for which reaſon he agreed to a truce with the regent for ſix months. In Picardy the Flemings were repulſed; and the count de Guiſe, with the duke of Lorrain, had the good fortune, with a handful of troops, to defeat and cut to pieces the German peaſants.

133 Francis I. carried to Madrid, where he ſigns a diſadvantageous treaty.

In the mean time, Francis was detained in captivity in Italy: but being wearied of his confinement in that country, and the princes of Italy beginning to cabal for his deliverance, he was carried to Madrid; where, on the 14th of January 1525, he ſigned a treaty, the principal articles of which were, That he ſhould reſign to the emperor the duchy of Burgundy in full ſovereignty; that he ſhould deſiſt from the homage which the emperor owed him for Artois and Flanders; that he ſhould renounce all claim to Naples, Milan, Aſti, Tournay, Liſle, and Heſdin, &c.; that he ſhould perſuade Henry d'Albert to reſign the kingdom of Navarre to the emperor, or at leaſt ſhould give him no aſſiſtance; that within 40 days he ſhould reſtore the duke of Bourbon and all his party to their eſtates; that he ſhould pay the king of England 500,000 crowns which the emperor owed him; that when the emperor went to Italy to receive the imperial crown, he ſhould lend him 12 galleys, four large ſhips, and a land-army, or inſtead of it 200,000 crowns.

All theſe articles the king of France promiſed on the word and honour of a prince to execute; or, in caſe of non-performance to return priſoner into Spain. But notwithſtanding theſe profeſſions, Francis had already proteſted before certain notaries and witneſſes in whom he could truſt, that the treaty he was about to ſign was againſt his will, and therefore null and void. On the 21ſt of February, the emperor thought fit to releaſe him from his priſon, in which he had been cloſely confined ever ſince his arrival in Spain; and after receiving the ſtrongeſt aſſurances from his own mouth, that he would literally fulfil the terms of the treaty, ſent him under a ſtrong guard to the frontiers, where he was exchanged for his two eldeſt ſons, who were to remain as hoſtages for his fidelity.

134 And break it.

When the king returned to his dominions, his firſt care was to get himſelf abſolved by the pope from the oaths he had taken; after which he entered into a league with the pontiff, the Venetians, the duke of Milan, and the king of England, for preſerving the peace of Italy. In the month of June, he publicly re-

received remonſtrances from the States of Burgundy; in which they told him, without ceremony, that by the treaty of Madrid he had done what he had no right to do, in breach of the laws and his coronation-oath; adding, that if he perſiſted in his reſolution of throwing them under a foreign yoke, they muſt appeal to the General States of the kingdom. At theſe remonſtrances the viceroy of Naples and the Spaniſh miniſters were preſent. They perceived the end which the king aimed at, and therefore expoſtulated with him in pretty warm terms. At laſt the viceroy told him, that he had now nothing left but to keep his royal word in returning to the caſtle of Madrid, as his predeceſſor John had done in a like caſe. To this the king replied, that king John acted rightly; that he returned to a king who had treated him like a king; but that at Madrid he had received ſuch uſage as would have been unbecoming to a gentleman: that he had often declared to the emperor's miniſters, that the terms they extorted from him were unjuſt and impracticable: but that he was ſtill willing to do all that was fit and reaſonable; and to ranſom his ſons at the rate of two millions of gold, in lieu of the duchy of Burgundy.

Hitherto the treaty for the tranquillity of Italy had been kept ſecret, in hopes that ſome mitigation of the treaty of Madrid would have been obtained; but now it was judged expedient to publiſh it, though the viceroy of Naples and the Spaniſh lords were ſtill at the French court; and the emperor was to be admitted into it, provided he accepted the king's offer of two millions for the releaſe of his children, and left the duke of Milan and other Italian princes in quiet poſſeſſion of their dominions. It is the common misfortune of all leagues, that the powers who enter into them keep only their own particular intereſts in view, and thus defeat the general intention of the confederacy. This was the caſe here. The king's great point was to obtain his children upon the terms he had propoſed; and he was deſirous of knowing what hopes there were of that, before he acted againſt the monarch who had them in his power. Thus the duke of Milan and the Pope were both ſacrificed. The former was obliged to ſurrender to the duke of Bourbon, and the latter was ſurpriſed by the Colonnas; both of which diſaſters would have been prevented if the French ſuccours had entered Italy in time. See ITALY.

According to an agreement which had been made between Francis and Henry, their ambaſſadors went into Spain, attended each of them by a herald, in order to ſummon the emperor to accept the terms which had been offered him; or, in caſe of a refuſal, to declare war. It ſeems the emperor's anſwer was foreſeen in the court of France; and therefore the king had previouſly called together an aſſembly of the notables; that is, perſons of the ſeveral ranks of his people in whom he could confide. To them he propoſed the great queſtion, Whether he was bound to perform the treaty of Madrid? or, Whether, if he did not perform it, he was obliged in honour to return to Spain? To both theſe queſtions, the aſſembly anſwered in the negative; they ſaid, that Burgundy was united to the crown of France, and that he could not ſeparate it by his own authority; that his perſon alſo was the property of the public, of which therefore he could not diſpoſe; but for the two millions, which they looked upon as a juſt equivalent, they undertook that it ſhould be raiſed for his ſervice. When the ambaſſadors delivered their propoſitions, Charles treated the Engliſh herald with reſpect, and the French one with contempt; which produced a challenge from Francis to the emperor*. All differences, however, were at laſt adjuſted; and a treaty was concluded at Cambray, on the 5th of Auguſt 1528. By this treaty, inſtead of the poſſeſſion, the emperor contented himſelf with reſerving his rights to the duchy of Burgundy, and the two millions of crowns already mentioned. Of theſe he was to receive 1,200,000 in ready money: the prince's lands in Flanders belonging to the houſe of Bourbon, were to be delivered up; theſe were valued at 400,000 more; and the remaining 400,000 were to be paid by France in diſcharge of the emperor's debt to England. Francis was likewiſe to diſcharge the penalty of 500,000 crowns which the emperor had incurred, by not marrying his niece the princeſs Mary of England; and to releaſe a rich *fleur de lys* which had been many years before pawned by the houſe of Burgundy for 50,000 crowns. The town and caſtle of Heſdin were alſo yielded; together with the ſovereignty of Flanders and Artois, and all the king's pretenſions in Italy. As for the allies of France, they were abandoned to the emperor's mercy, without the leaſt ſtipulation in their favour; and Francis himſelf proteſted againſt the validity of the treaty before he ratified it, as did alſo his attorney-general before he regiſtered it in parliament; but both of them with the greateſt ſecrecy imaginable.

135 Treaty of Cambray.

136 Francis dies and is ſucceeded by Henry II.

Nothing farther of much conſequence happened during the remainder of the reign of Francis I. The war was ſoon renewed with Charles, who made an invaſion into France, but with very bad ſucceſs; nor was peace fully eſtabliſhed but by the death of Francis, which happened on the 3d of March, 1547. He was ſucceeded by his ſon Henry II. who aſcended the throne the very day on which he was 29 years of age. In the beginning of his reign, an inſurrection happened in Guienne, owing to the oppreſſive conduct of the officers who levied the ſalt tax. The king diſpatched againſt the inſurgents two bodies of troops; one commanded by the duke of Aumale ſon to the duke of Guiſe, the other by the conſtable. The firſt behaved with the greateſt moderation, and brought back the people to their duty without making many examples; the other behaved with the utmoſt haughtineſs and cruelty; and though the king afterwards remitted many of his puniſhments, yet from that time the conſtable became odious to the people, while the family of Guiſe were highly reſpected.

137 Henry perſecutes the Proteſtants

In 1548, the king began to execute the edicts which had been made againſt the Proteſtants with the utmoſt ſeverity; and, thinking even the clergy too mild in the proſecution of hereſy, erected for that purpoſe a chamber compoſed of members of the parliament of Paris. At the queen's coronation, which happened this year, he cauſed a number of Proteſtants to be burned, and was himſelf preſent at the ſpectacle. He was, however, ſo much ſhocked, that he could never forget it; but complained, as long as he lived, that, at certain times, it appeared before his eyes, and troubled his underſtanding.

In 1549, a peace being concluded with England, the king purchaſed Boulogne from the latter, for the ſum of 400,000 crowns; one half to be paid on the day of reſtitution, and the other a few months after.—Scotland was included in the treaty, and the Engliſh reſtored ſome places they had taken there. This was the moſt advantageous peace that France had hitherto made with England; the vaſt arrears which were due to that crown being in effect remitted; and the penſion which looked ſo like tribute, not being mentioned, was in fact extinguiſhed. The earl of Warwick himſelf, who had concluded the peace, was ſo ſenſible of the diſgrace ſuffered by his nation on this occaſion, that he pretended to be ſick, in order to avoid ſetting his hand to ſuch a ſcandalous bargain.

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* See *Duel*.

138 Advantageous treaty with England.

139 Henry's ſucceſs againſt the emperor.

140 He is killed at a tournament.

This year, an edict was made to reſtrain the extravagant remittances which the clergy had been in uſe of making to the court of Rome, and for correcting ſome other abuſes committed by the papal notaries.—With this edict pope Julius III. was highly diſpleaſed; and the following year (1550), war was declared by the king of France againſt the pope and the emperor. The pretence was, that Henry protected Octavio Farneſe, duke of Parma, whom the pope was deſirous of depriving of his dominions. In this war the king was threatened with the cenſures of the church, more eſpecially when it was known that he had entered into an alliance with the Turks, and a Turkiſh fleet entered the Mediterranean, where they threatened the iſle of Gozo, and made deſcents upon Sicily. Henry, however, ſtrongly denied any ſuch connection, and inſiſted that the emperor had given them ſufficient provocation: but, be this as it will, the emperor ſoon found himſelf in ſuch danger from theſe new enemies, that he could not ſupport the pope as he intended, who on that account was obliged to ſue for peace. After this, the king continued the war againſt the emperor with ſucceſs; reducing the cities of Toul, Verdun, and Metz. He then entered the country of Alſace, and reduced all the fortreſſes between Hagenau and Wiſſemburg. He failed, however, in his attempt on Straſburg: and was ſoon after obliged by the German princes and the Swiſs to deſiſt from further conqueſts on that ſide. This war continued with very little interruption, and as little ſucceſs on the part of the French, till the year 1557, when a peace was concluded; and ſoon after, the king was killed at a tournament, by one count de Montgomery, who was reckoned one of the ſtrongeſt knights in France, and who had done all he could to avoid this encounter with the king.

141 Civil wars with the proteſtants.

The reign of his ſucceſſor Francis II. was remarkable only for the perſecution of the Proteſtants; which became ſo grievous, that they were obliged to take up arms in their own defence. This occaſioned ſeveral civil wars, the firſt of which commenced in the reign of Charles IX. who ſucceeded to the throne in 1560. This firſt war continued till the year 1562, when a peace was concluded, by which the Proteſtants were to have a free pardon, and liberty of conſcience. In 1565, the war broke out anew, and was continued with very little interruption till 1569, when peace was again concluded upon very advantageous terms for the Proteſtants. After this, king Charles, who had now taken the government into his hands, careſſed the Proteſtants in an extraordinary manner. He invited to court the admiral Coligni, who was the head of the Proteſtant party; and cajoled him ſo, that he was lulled into a perfect ſecurity, notwithſtanding the many warnings given him by his friends, that the king's fair ſpeeches were by no means to be truſted: but he had ſoon reaſon to repent his confidence. On the 22d of Auguſt 1571, as he was walking from the court to his lodgings, he received a ſhot from a window, which carried away the ſecond finger of his right hand, and wounded him grievouſly in the left arm. This he himſelf aſcribed to the malice of the duke of Guiſe, the head of the Catholic party. After dinner, however, the king went to pay him a viſit, and amongſt others made him this compliment; "You have received the wound, but it is I who ſuffer;" deſiring at the ſame time, that he would order his friends to quarter about his houſe, and promiſing to hinder the Catholics from entering that quarter after it was dark. This ſatisfied the admiral of the king's ſincerity; and hindered him from complying with the deſires of his friends, who would have carried him away, and who were ſtrong enough to have forced a paſſage out of Paris if they had attempted it.

142 Dreadful maſſacre of the Proteſtants.

In the evening, the queen mother, Katharine de Medicis, held a cabinet-council to fix the execution of the maſſacre of the Proteſtants, which had been long meditated. The perſons of which this council was compoſed were, Henry duke of Anjou, the king's brother; Gonzagua duke of Nevers; Henry of Angouleſme, grand prior of France, and baſtard brother of the king; the marſhal de Tavannes; and Albert de Gondi, count de Rhetz. The direction of the whole was given to the duke of Guiſe, to whom the adminiſtration had been entirely confided during the former reign. The guards were appointed to be in arms, and the city-officers were to diſpoſe the militia to execute the king's orders, of which the ſignal was the ringing of a bell near the Louvre. Some ſay, that when the hour approached, which was that of midnight, the king grew undetermined: that he expreſſed his horror at ſhedding ſo much blood, eſpecially conſidering that the people whom he was going to deſtroy were his ſubjects, who had come to the capital at his command, and in confidence of his word; and particularly the admiral, whom he had detained ſo lately by his careſſes. The queen-mother, however, reproached him with his cowardice, and repreſented to him the great danger he was in from the Proteſtants; which at laſt induced him to conſent. According to others, however, the king himſelf urged on the maſſacre; and when it was propoſed to him to take off only a few of the heads, he cried out, "If any are to die, let there not be one left to reproach me with breach of faith."

As ſoon as the ſignal was given, a body of Swiſs troops, of the Catholic religion, headed by the duke of Guiſe, the chevalier d'Angouleſme, accompanied by many perſons of quality, attacked the admiral's houſe. Having forced open the doors, the foremoſt of the aſſaſſins ruſhed into his apartment; and one of them aſked if he was Coligni? To this he anſwered that he was; adding, "Young man, reſpect theſe grey hairs:" to which the aſſaſſin replied by running him through the body with his ſword. The duke of Guiſe and the chevalier, growing impatient below ſtairs, cried out to know if the buſineſs was done; and being told that it was, commanded that the body ſhould be thrown out at the window. As ſoon as it fell on the ground, the chevalier, (or as ſome ſay) the duke of Guiſe, wiping the blood off the face, kicked it with his foot. The body was then abandoned to the fury of the populace; who after a ſeries of indignities, dragged it to the common gallows, to which they chained it by the feet, the head being cut off and carried to the queen-mother; who, it is ſaid, cauſed, it to be enbalmed and ſent to Rome. The king himſelf went to ſee the body hang upon the gibbet; where a fire being kindled under it, part was burnt, and the reſt ſcorched. In the Louvre the gentlemen belonging to the king of Navarre and the princeſs of Condé were murdered under the king's eye. Two of them wounded, and purſued by the aſſaſſins, fled into the bed-chamber of the queen of Navarre, and jumped upon her bed, beſeeching her to ſave their lives; and as ſhe went to aſk this favour of the queen-mother, two more, under the like circumſtances, ruſhed into the room, and threw themſelves at her feet. The queen-mother came to the window to enjoy theſe dreadful ſcenes; and the king, ſeeing the Proteſtants who lodged on the other ſide of the river, flying for their lives, called for his long gun, and fired upon them. In the ſpace of three or four days, many thouſands were deſtroyed in the city of Paris, by the moſt cruel deaths which malice itſelf could invent. Peter Ramus, profeſſor of philoſophy and mathematics, after being robbed of all he had, his belly being firſt ripped open, was thrown out of a window. This ſo much affected Dennis Lambin the king's profeſſor, that, though a zealous Catholic, he died of terror. The firſt two days, the king denied it was done by his orders, and threw the whole blame on the houſe of Guiſe: but, on the 28th of Auguſt, he went to the parliament, avowed it, was complimented upon it, and directed a proceſs againſt the admiral, by which he was ſtigmatized as a traitor. Two innocent gentlemen ſuffered as his accomplices in a pretended plot againſt the life of the king, in order to ſet the crown on the head of the prince of Condé. They were executed by torch light; and the king and the queen-mother (with the king of Navarre and the prince of Condé by force) were ſpectators of this horrid fact; and they alſo aſſiſted at the jubilee to thank God for the execution of ſuch an infamous deſign.

This maſſacre was not confined to the city of Paris alone. On the eve of St Bartholomew, orders had been ſent to the governors of provinces to fall upon the Proteſtants themſelves, and to let looſe the people upon them; and though an edict was publiſhed before the end of the week, aſſuring them of the king's protection, and that he by no means deſigned to exterminate them becauſe of their religion, yet private orders were ſent of a nature directly contrary; in conſequence of which the maſſacre, or (as, in alluſion to the Sicilian veſpers *, it was now ſtyled) the *Matins of Paris*, were repeated in Meaux, Orleans, Troyes, Angers, Tholouſe, Rouen, and Lyons; ſo that in the ſpace of two months 30,000 Proteſtants were butchered. The next year Rochelle, the only ſtrong fortreſs which the Proteſtants held in France, was beſieged, but was not taken without the loſs of 24,000 of the Catholics who beſieged it. After this a pacification enſued on terms favourable to the Proteſtants, but to which they never truſted.

*See *Sicily*.

143
Death of Charles IX.

This year the duke of Anjou was elected king of Poland, and ſoon after ſet out to take poſſeſſion of his new kingdom. The king accompanied him to the frontiers of the kingdom; but during the journey was ſeized with a ſlow fever, which from the beginning had a very dangerous appearance. He lingered for ſome time under the moſt terrible agonies both of body and mind; and at laſt died on the 30th of May 1572, having lived 24 years, and reigned 13. It is ſaid, that after the dreadful maſſacre abovementioned, this prince had a fierceneſs in his looks and a colour in his cheeks which he never had before. He ſlept little, and never ſound. He waked frequently in agonies, and had ſoft muſic to compoſe him again to reſt.

144
Henry III.

During the firſt years of the reign of Henry III. who ſucceeded his brother Charles, the war with the Proteſtants was carried on with different ſucceſs on the part of the Catholics. In 1575, a peace was concluded, called by way of eminence the *Edict of Pacification*. It conſiſted of no fewer than 63 articles; the ſubſtance of which was, that liberty of conſcience, and the public exerciſe of religion were granted to the reformed without any other reſtriction than that they ſhould not preach within two leagues of Paris or any other part where the court was: Party chambers were erected in every parliament, to conſiſt of equal numbers of Catholics and Proteſtants, before whom all judgments were to be tried: The judgments againſt the admiral, and, in general, all who had fallen in the war or been executed, were reverſed; and eight cautionary towns were given to the Proteſtants.

145
Catholic league formed.

This edict gave occaſion to the Guiſes to form an aſſociation in defence, as was pretended, of the Catholic religion, afterwards known by the name of the *Catholic League*. In this league though the king was mentioned with reſpect, he could not help ſeeing that it ſtruck at the very root of his authority: for, as the Proteſtants had already their chiefs, ſo the Catholics were, for the future, to depend entirely upon the chief of the league; and were, by the very words of it, to execute whatever he commanded, for the good of the cauſe, againſt any, without exception of perſons. The king, to avoid the bad effects of this, by the advice of his council declared himſelf head of the league; and of conſequence recommenced the war againſt the Proteſtants, which was not extinguiſhed as long as he lived.

The faction of the duke of Guiſe, in the mean time, took a reſolution of ſupporting Charles cardinal of Bourbon, a weak old man, as preſumptive heir of the crown. In 1584 they entered into a league with Spain, and took up arms againſt the king: and tho' peace was concluded the ſame year, yet in 1587 they again proceeded to ſuch extremities, that the king was forced to fly from Paris. Another reconciliation was ſoon after effected; but it is generally believed that the king from this time reſolved on the deſtruction of Guiſe. Accordingly, finding that this nobleman ſtill behaved towards him with his uſual inſolence, the king cauſed him to be ſtabbed, as he was coming into his preſence, by his guards, on the 23d of December 1587. The king himſelf did not long ſurvive him; being ſtabbed by one James Clement, a Jacobine monk, on the firſt of Auguſt 1588. His wound at firſt was not thought mortal: but his frequent ſwooning quickly diſcovered his danger; and he died next morning, in the 39th year of his age, and 16th of his reign.

146
Duke of Guiſe murdered and likewiſe the king.

Before the king's death, he nominated Henry Bourbon king of Navarre for his ſucceſſor on the throne of France; but as he was a Proteſtant, or at leaſt one who greatly favoured their cauſe, he was at firſt owned by very few except thoſe of the Proteſtant party. He met with the moſt violent oppoſition from the members of the Catholic league; and was often reduced to ſuch ſtraits, that he went to people's houſes under colour of viſits, when in reality he had not a dinner in his own. By his activity and perſeverance, however, he was at laſt acknowledged throughout the whole kingdom, to which his abjuration of the Proteſtant religion contributed not a little. As the king of Spain had laid claim to the crown of France, Henry no ſooner found himſelf in a fair way of being firmly ſeated on the throne, than he formally declared war againſt that kingdom; in which he at laſt proved ſucceſsful, and in 1597 entered upon the quite poſſeſſion of his kindom.

147
Henry IV,

148
Edict of Nantes.

149
The king propoſes to new-model the European powers.

The king's firſt care was to put an end to the religious diſputes which had ſo long diſtracted the kingdom. For this purpoſe, he granted the famous edict, dated at Nantes, April 13. 1598. It reeſtabliſhed, in a moſt ſolid and effectual manner, all the favours that had ever been granted to the reformed by other princes; adding ſome which had not been thought of before, particularly the allowing them a free admiſſion to all employments of truſt, profit, and honour; the eſtabliſhing chambers in which the members of the two religions were equal; and the permitting their children to be educated without conſtraint in any of the univerſities. Soon after, he concluded peace with Spain upon very advantageous terms. This gave him an opportunity of reſtoring order and juſtice throughout his dominions; of repairing all the ravages occaſioned by the civil war; and aboliſhing all thoſe innovations which had been made, either to the prejudice of the prerogatives of the crown or the welfare of the people. His ſchemes of reformation, indeed, he intended to have carried beyond the boundaries of France. If we may believe the duke of Sully, he had in view no leſs a deſign than the new modelling of all Europe. He imagined that the European powers might be formed into a kind of Chriſtian republic, by rendering them as nearly as poſſible of equal ſtrength; and that this republic might be maintained in perpetual peace, by bringing all their differences to be decided before a ſenate of wiſe, diſintereſted, and able judges: and then he thought it would be no difficult matter to overturn the Ottoman empire. The number of theſe powers was to be 15; *viz.* the Papacy; the empire of Germany; France; Spain; Hungary; Great Britain; Bohemia; Lombardy, Poland; Sweden; Denmark; the republic of Venice; the States-General; the Swiſs Cantons; and the Italian commonwealth, which was to comprehend the ſtates of Florence, Genoa, Lucca, Modena, Parma, Mantua, and Monaco. In order to render the ſtates equal, the empire was to be be given to duke of Bavaria; the kingdom of Naples to the pope; that of Sicily to the Venetians: Milan to the duke of Savoy, who, by this acquiſition, was to become king of Lombardy; the Auſtrian Low Countries were to be added to the Dutch republic; Franche Compte, Alſace, and the country of Trent, were to be given to the Swiſs. With a view, it is now thought, of executing this grand project, but under pretence of reducing the exorbitant power of the houſe of Auſtria, Henry made immenſe preparations both by ſea and land; but if he really had ſuch a deſign, he was prevented by death from attempting to execute it. He was ſtabbed in his coach by one Ravilliac, on the 12th of May 1608.

150
He is murdered.

151
Louis XIII.

On the death of Henry IV. the queen-mother aſſumed the regency. Ravilliac was executed, after ſuffering horrid tortures. It is ſaid that he made a confeſſion, which was ſo written by the perſon who took it down, that not one word of it could ever be read, and thus his inſtigators and accomplices could never be diſcovered. The regency, during the minority of Louis XIII. was only remarkable for cabals and intrigues of the courtiers. In 1617, the king aſſumed the government himſelf, baniſhed the queen-mother to Blois, cauſed her favourite marſhal d'Ancre to be killed, and choſe for his miniſter the famous cardinal Richlieu. In 1620, a new war broke out between the Catholics and Proteſtants, which was carried on with the greateſt fury on both ſides; and we may judge of the ſpirit which actuated both parties, by what happened at Negrepliſſe, a town in Quercy. This place was beſieged by the king's troops, and it was reſolved to make an example of the inhabitants. The latter, however, abſolutely refuſed to ſurrender upon any terms. They defended themſelves, therefore, moſt deſperately; and the city being at laſt taken by ſtorm, they were all maſſacred, without reſpect of rank, ſex, or age, except ten men. When theſe were brought into the king's preſence, he told them they did not deſerve mercy: they anſwered, that they would not receive it; that the only favour they aſked, was to be hanged on trees in their own gardens; which was granted, and the place reduced to aſhes. Both parties ſoon became weary of ſuch a deſtructive war; and a peace was concluded in 1621, by which the edict of Nantes was confirmed. This treaty, however, was of no long duration. A new war broke out which laſted till the year 1628, when the edict of Nantes was again confirmed; only the Proteſtants were deprived of all their cautionary towns, and conſequently of the power of defending themſelves in time to come. This put an end to the civil wars on account of religion in France. Hiſtorians ſay, that in theſe wars above a million of men loſt their lives; that 150,000,000 livres were ſpent in carrying them on; and that 9 cities, 400 villages, 2000 churches, 2000 monaſteries, and 10,000 houſes, were burnt or otherwiſe deſtroyed during their continuance. The nex tyear, the king was attacked with a ſlow fever which nothing could allay, an extreme depreſſion of ſpirits, and prodigious ſwelling in in his ſtomach and belly. The year after, however, he recovered to the great diſappointment of his mother, who had been in hopes of regaining her power. She was arreſted: but found means to eſcape into Flenders, where ſhe remained during the reſt of this reign. Richlieu, by a maſterly train of politics, though himſelf was next to an enthuſiaſt for popery, ſupported the

Proteſtants of Germany and Guſtavus Adolphus againſt the houſe of Auſtria; and after quelling all the rebellions and conſpiracies which had been formed againſt him in France, he died ſome months before Louis XIII. in 1643.

152 Louis XIV. Louis XIV. ſurnamed *le Grand*, ſucceeded to the throne when he was only five years of age. During his minority, the kingdom was torn in pieces under the adminiſtration of his mother Anne of Auſtria, by the factions of the great, and the diviſions between the court and parliament, for the moſt trifling cauſes, and upon the moſt deſpicable principles. The prince of Condé flamed like a blazing ſtar; ſometimes a patriot, ſometimes a courtier, and ſometimes a rebel. He was oppoſed by the celebrated Turenne, who from a Proteſtant had turned Papiſt. The nation of France was involved at once in civil and domeſtic wars; but the queen-mother having made choice of cardinal Mazarine for her firſt miniſter, he found means to turn the arms even of Cromwell againſt the Spaniards, and to divide the domeſtic enemies of the court ſo effectually among themſelves, that when Louis aſſumed the reins of government into his own hands, he found himſelf the moſt abſolute monarch that had ever ſat upon the throne of France. He had the good fortune, on the death of Mazarine, to put the domeſtic adminiſtration of his affairs into the hands of Colbert, who formed new ſyſtems for the glory, commerce, and manufactures of France, all which he carried to a ſurpriſing height. The king himſelf, ignorant and vain, was blind to every patriotic duty of a king, promoting the intereſts of his ſubjects only that they might the better anſwer the purpoſes of his greatneſs: and by his ambition he embroiled himſelf with all his neighbours, and wantonly rendered Germany a diſmal ſcene of devaſtation. By his impolitic and unjuſt revocation of the edict of Nantes in the year 1685, with the dragooning* the proteſtants that followed it, he obliged them to take ſhelter in England, Holland, and different parts of Germany, where they eſtabliſhed the ſilk manufactories, to the great prejuce of their own country. He was ſo blinded by flattery, that he arrogated to himſelf the divine honours paid to the pagan emperors of Rome. He made and broke treaties for his conveniency: and in the end he raiſed againſt himſelf a confederacy of almoſt all the other princes of Europe; at the head of which was king William III. of England. He was ſo well ſerved, that he made head for ſome years againſt this alliance; and France ſeemed to have attained the higheſt pitch of military glory, under the conduct of thoſe renowed generals Condé and Turenne. (See UNITED PROVINCES.) At length, having provoked the Engliſh by his repeated infidelities, their arms under the duke of Marlborough, and thoſe of the Auſtrians under prince Eugene, rendered the latter part of Louis's life as miſerable as the beginning of it was ſplendid. His reign, from the year 1702 to 1711, was one continued ſeries of defeats and calamities; and he had the mortification of ſeeing thoſe places taken from him, which, in the former part of his reign, were acquired at the expence of many thouſand lives. (See BRITAIN, nº 342, &c.)—Juſt as he was reduced, old as he was, to the deſperate reſolution of collecting his people and dying at their head, he was ſaved by the Engliſh Tory miniſtry deſerting the cauſe, withdrawing from their allies, and concluding the peace of Utrecht in 1713. See BRITAIN, nº 371, &c.

The laſt years of Louis XIV. were alſo embittered by domeſtic calamities; which, added to thoſe he had already endured of a public nature, impreſſed him with a deep melancholy. He had been for ſome time afflicted with a fiſtula: which, though ſucceſsfully cut, ever afterwards effected his health. The year before the peace, his only ſon, the duke of Burgundy, died, together with the ducheſs and their eldeſt ſon; and the only remaining child was left at the point of death. The king himſelf ſurvived till the month of September 1715; but on the 14th of that month expired, leaving the kingdom to his great grandſon Louis, then a minor.

153 Louis XV. 154 Adminiſtration of the duke of Orleans. By the laſt will of Louis he had devolved the regency, during the minority of the young king, upon a council, at the head of which was the duke of Orleans. That noblemen, however, diſguſted with a diſpoſition which gave him only a caſting vote, appealed to the parliament of Paris, who ſet aſide the will of the late king, and declared him ſole regent. His firſt acts were extremely popular, and gave the moſt favourable ideas of his government and character. He reſtored to the parliament the right which had been taken from them of remonſtrating againſt the edicts of the crown, and compelled thoſe who had enriched themſelves during the calamities of the former reign to reſtore their wealth. He alſo took every method to efface the calamities occaſioned by the unſucceſsful wars in which his predeceſſor had engaged: promoted commerce and agriculture; and, by a cloſe alliance with Great Britain and the United Provinces, ſeemed to lay the foundation of a laſting tranquillity. This happy proſpect, however, was ſoon overcaſt by the intrigues of Alberoni the Spaniſh miniſter, who had formed a deſign of recovering Sardinia from the emperor, Sicily from the duke of Savoy, and of eſtabliſhing the Pretender on the throne of Britain. To accompliſh theſe purpoſes, he negociated with the Ottoman Porte, Peter the Great of Ruſſia, and Charles XII. of Sweden; the Turks intending to reſume the war againſt the emperor; the two latter to invade Great Britain. But as long as the duke of Orleans retained the adminiſtration of France, he found it impoſſible to bring his ſchemes to bear. To remove him, therefore, he fomented diviſions in the kingdom. An inſurrection too place in Brittany; and Alberoni ſent ſmall parties in diſguiſe into the country, in order te ſupport the inſurgents, and even laid plots to ſeize the regent himſelf. All of a ſudden, however, the Spaniſh miniſter found himſelf diſappointed in every one of his ſchemes. His partiſans in France were put to death; the king of Sweden was killed at Frederickſhall in Norway; the Czar, intent on making new regulations, could not be perſuaded to make war upon Britain; and the Turks refuſed to engage in a war with the emperor, from whom they had lately ſuffered ſo much. The cardinal, nevertheleſs, continued his intrigues; which quickly produced a war betwixt Spain on the one part, and France and Britain on the other. The Spaniards, unable to reſiſt the union of two ſuch formidable powers, were ſoon reduced to the neceſſity of ſuing for peace; and the terms were dictated

* See *Dragooning*.

tated by the regent of France; and of theſe the diſmiſſion of Alberoni the Spaniſh miniſter was one. A double marriage was now ſet on foot: the duke of Orleans gave his own daughter, Madamoiſelle Montpenſier, to Don Lewis prince of Aſturias, while the Infanta of Spain was betrothed to her couſin, the king of France. From this time the houſe of Bourbon continued united; both princes being convinced, that it was their intereſt not to waſte their ſtrength in wars againſt each other.

155 Deſtructive project of John Law.

The ſpirit of conqueſt having now in a great meaſure ſubſided, and that of commerce taken place throughout the world in general, France became the ſcene of as remarkable a project in the commercial way as ever was known in any country. One John Law, a Scotſman, having been obliged to fly from his own country for murder, laid the plan of a company which might by its notes pay off the debt of the nation, and reimburſe itſelf by the profits. Law had wandered through various parts of Europe, and had ſucceſſively endeavoured to engroſs the attention of various courts. The propoſal was made to Victor Amadeus king of Sicily; but he diſmiſſed Law with a reply, that "he was not rich enough to ruin himſelf: but in France it was looked upon in a more favourable light; the nation being at this time involved in a debt of 200 millions, and the regent, as well as the people in general, very fond of embarking in new ſchemes. The bank, thus eſtabliſhed, proceeded at firſt with ſome degree of caution; but having by degrees extended their credit to more than 80 times their real ſtock, they ſoon became unable to anſwer the demands made upon them; ſo that the company was diſſolved the very ſame year in which it had been inſtituted. The confuſion into which the kingdom was thrown by this fatal ſcheme, required the utmoſt exertions of the regent to put a ſtop to it; and ſcarcely was this accompliſhed, when the king in 1723, took the government into his own hands. The duke then became miniſter; but did not long enjoy this poſt. His irregularities had broken his conſtitution, and brought on a number of maladies, under which he in a ſhort time ſunk, and was ſucceeded in his adminiſtration by the duke of Bourbon Conde. The king, as we have already remarked, had been married, when very young, to the Infanta of Spain, though by reaſon of his tender years the marriage had never been completed. The princeſs, however, had been brought to Paris, and for ſome time treated as queen of France; but as Louis grew up, it was eaſy to ſee that he had contracted an inveterate hatred againſt the intended partner of his bed. The miniſter, therefore, at laſt conſented that the princeſs ſhould be ſent back; an affront ſo much reſented by the queen her mother, that it had almoſt produced a war betwixt the two nations.

156 The king takes the government into his own hands.

157 The Infanta of Spain ſent back.

The diſſolution of the marriage of Louis was the laſt act of Conde's adminiſtration; and the procuring of a new match was the firſt act of his ſucceſſor Cardinal Fleury. The princeſs pitched upon was the daughter of Staniſlaus Leſczinſki, king of Poland, who had been depoſed by Charles XII. of Sweden. The princeſs was deſtitute of perſonal charms, but of an amiable diſpoſition; and though it is probable that ſhe never poſſeſſed the love of her huſband, her excellent qualities could not but extort his eſteem; and the birth of a prince ſoon after their marriage removed all the fears of the people concerning the ſucceſſion.

158 Marriage with the daughter of Staniſlaus king of Poland.

Cardinal Fleury continued the pacific ſchemes purſued by his predeceſſors; though they were ſomewhat interrupted by the war which took place in the year 1733. Notwithſtanding the connection betwixt that monarch and the French nation, however, Fleury was ſo parſimonious in his aſſiſtance, that only 1500 ſoldiers were ſent to relieve Dantzic, where Staniſlaus himſelf reſided, and who at that time was beſieged by the Ruſſians. This pitiful reinforcement was ſoon overwhelmed by a multitude of Ruſſians; and Staniſlaus was at laſt obliged to renounce all thoughts of the crown of Poland, though he was permitted to retain the title of king: and that this title might not be merely nominal, the king of France conſented to beſtow upon him the duchies of Bar and Lorrain; ſo that, after the death of Staniſlaus, theſe territories were indiſſolubly united to the dominions of France. Fleury ſteadily purſued his pacific plans, and the diſputes between Spain and England in 1737 very little affected the peace of that kingdom; and it muſt be remembered to his praiſe, that inſtead of fomenting the quarrels betwixt the neighbouring potentates, he laboured inceſſantly to keep them at peace. He reconciled the Genoeſe and Corſicans, who were at war; and his mediation was accepted by the Ottoman Porte, who at that time carried on a ſucceſsful war with the emperor of Germany, but made peace with him at the interceſſion of the cardinal. All his endeavours to preſerve the general peace, however, proved at laſt ineffectual. The death of the emperor Charles VI. in 1740, the laſt prince of the houſe of Auſtria, ſet all Europe in a flame. The emperor's eldeſt daughter, Maria Thereſa, claimed the Auſtrian ſucceſſion, which comprehended the kingdoms of Hungary and Bohemia, the duchy of Sileſia, Auſtrian Suabia, Upper and Lower Auſtria, Styria, Carinthia, Carniola; the four foreſt towns; Burgaw; Briſgaw; the Low Countries; Friuli; Tyrol; the duchy of Milan; and the duchies of Parma and Placentia. Among the many competitors who pretended a right to ſhare, or wholly to inherit theſe extenſive dominions, the king of France was one. But as he wiſhed not to awaken the jealouſy of the European princes by preferring directly his own pretenſions, he choſe rather to ſupport thoſe of Frederic III. who laid claim to the duchy of Sileſia. This brought on the war of 1740; and of which an account is given under the articles Britain and Pruſſia. It was terminated in 1748 by the treaty of Aix-la-Chapelle; but to this Louis, who ſecretly meditated a ſevere revenge againſt Britain, only conſented, that he might have time to recruit his fleet and put himſelf ſomewhat more upon an equality with that formidable power. But while he meditated great exploits of this kind, the internal tranquillity of the kingdom was diſturbed by violent diſputes betwixt the clergy and parliaments of France. In the reign of Louis XIV. there had been violent conteſts betwixt the Janſeniſts and Jeſuits concerning free-will and other obſcure points of theology; and the opinions of the Janſeniſts had been declared heretical by the celebrated papal bull named *Unigenitus*; the reception of which was enforced by the king, in oppoſition to the parliaments, the archbiſhop of Paris, and the body of the

159 Diſputes betwixt the parliaments and clergy.

people. The archbiſhop, with 15 other prelates, proteſted againſt it as an infringement of the rights of the Gallican church, of the laws of the realm, and an inſult on the rights of the people themſelves. The duke of Orleans favoured the bull by inducing the biſhops to ſubmit to it; but at the ſame time ſtopped a perſecution which was going on againſt its opponents. Thus matters paſſed over till the concluſion of the peace; a ſhort time after which the jealouſy of the clergy was awakened by an attempt of the miniſter of ſtate to inquire into the wealth of individuals of their order. To prevent this, they rivived the conteſt about the bull Unigenitus; and it was reſolved, that confeſſional notes ſhould be obtained of dying perſons; that theſe notes ſhould be ſigned by prieſts who maintained the authority of the bull; and that, without ſuch notes, no perſon could obtain a viaticum, or extreme unction. On this occaſion the new archbiſhop of Paris, and the parliament of that city, took oppoſite ſides; the latter impriſoning ſuch of the clergy as refuſed to adminiſter the ſacraments excepting in the circumſtances abovementioned. Other parliaments followed the example of that of Paris; and a war was inſtantly kindled betwixt the civil and eccleſiaſtical departments of the ſtate. In this diſpute the king interfered, forbad the parliaments to take cognizance of eccleſiaſtical proceedings, and commanded them to ſuſpend all proſecutions relative to the refuſal of the ſacraments: but inſtead of acquieſcing, the parliament preſented new remonſtrances, refuſed to attend any other buſineſs, and reſolved that they could not obey this injunction without violating their duty as well as their oath. They cited the biſhop of Orleans before their tribunal, and ordered all writings, in which its juriſdiction was diſputed, to be burnt by the executioner. By the aſſiſtance of the military, they enforced the adminiſtration of the ſacraments to the ſick, and ceaſed to diſtribute that juſtice to the ſubject for which they had been originally inſtituted.

160
Parliament of Paris baniſhed.

The king, enraged at their obſtinacy, arreſted and impriſoned four of the members who had been moſt obſtinate, and baniſhed the remainder to Bourges, Poictiers, and Auvergne; while, to prevent any impediment from taking place in the adminiſtration of juſtice by their abſence, he iſſued letters patent, by which a royal chamber for the proſecution of civil and criminal ſuits was inſtituted. The counſellors refuſed to plead before theſe new courts; and the king, finding at laſt that the whole nation was about to fall into a ſtate of anarchy, thought proper to recall the parliament. The baniſhed members entered Paris amidſt the acclamations of the inhabitants; and the archbiſhop, who ſtill continued to encourage the prieſts in refuſing the ſacraments, was baniſhed to his ſeat at Conflans; the biſhop of Orleans and Troyes were in like manner baniſhed, and a calm for the preſent reſtored to the kingdom.

161
New diſputes betwixt the king and parliament

The tranquillity thus eſtabliſhed was of no long duration. In the year 1756, the parliament again fell under the diſpleaſure of the king by their imprudent perſecution of thoſe who adhered to the bull Unigenitus. They proceeded ſo far in this oppoſition as to refuſe to regiſter certain taxes abſolutely neceſſary for the carrying on of the war. By this Louis was ſo provoked, that he ſuppreſſed the fourth and fifth chambers of inqueſts, the members of which had diſtinguiſhed themſelves by their oppoſition to his will. He commanded the bull Unigenitus to be reſpected, and prohibited the ſecular judges from ordering the adminiſtration of the ſacraments. On this 15 counſellors of the great chamber reſigned their offices, and 124 members of the different parliaments followed their example; and the moſt grievous diſcontents took place throughout the kingdom. An attempt was made by a fanatic, named *Damien*, to aſſaſſinate him; and the king was actually wounded, though ſlightly, between the ribs, in the preſence of his ſon and in the midſt of his guards. The aſſaſſin was put to the moſt exquiſite tortures; in the midſt of which he perſiſted, in the moſt obſtinate manner, to declare that he had no intention to kill the king; but that his deſign was only to wound him, that God might touch his heart, and incline him to reſtore peace to his dominions, &c. Theſe expreſſions, which undoubtedly indicated inſanity, had no effect on his mercileſs judges, who conſigned him to one of the moſt horrid deaths the ingenuity or cruelty of man could invent. This attempt, however, ſeems to have had ſome effect upon the king, as he ſoon after baniſhed the archbiſhop of Paris, who had been recalled, and accommodated matters with his parliament once more.

162
Family compact between France and Spain eſtabliſhed.

The unfortunate event of the war of 1755 had brought the nation to the brink of ruin, when Louis implored the aſſiſtance of Spain; and on this occaſion the celebrated *Family Compact* was ſigned; by which, with the ſingle exception of the American trade, the ſubjects of France and Spain are naturalized in both kingdoms, and the enemy of the one ſovereign is invariably to be looked upon as the enemy of the other. At this time, however, the aſſiſtance of Spain availed very little; both powers were reduced to the loweſt ebb, and the arms of Britain were triumphant in every quarter of the globe. See the article **Britain**.

163
Expulſion of the Jeſuits.

The peace concluded at Paris in the year 1763, though it freed the nation from a moſt deſtructive and bloody war, did not reſtore its internal tranquillity. The parliament, eager to purſue the victory they had formerly gained over their religious enemies, now directed their efforts againſt the Jeſuits, who had obtained and enforced the bull Unigenitus. That once powerful order, however, was now on the brink of deſtruction. A general deteſtation of its members had taken place throughout the whole world. A conſpiracy formed by them againſt the king of Portugal, and from which he narrowly eſcaped, had rouſed the indignation of Europe, and this was ſtill farther inflamed by ſome fraudulent practices of which they had been guilty in France. Le Valette, the chief of their miſſionaries at Martinico, had, ever ſince the peace of Aix-la-Chapelle, carried on a very extenſive commerce, inſomuch that he even aſpired at monopolizing the whole Weſt-India trade when the war with Britain commenced in 1755. Leonay and Gouffre, merchants at Marſeilles, in expectation of receiving merchandize to the value of two millions from him, had accepted of bills drawn by the Jeſuits to the amount of a million and an half. Unhappily they were diſappointed by the vaſt numbers of captures made by the Britiſh; in conſequence of which they were obliged to apply to the Society of Jeſuits at large; but they, either ignorant of their true intereſt, or too ſlow in giving aſſiſtance,

ance, ſuffered the merchants to ſtop payment, and thus not only to bring ruin upon themſelves, but to involve, as it is uſual in ſuch caſes, a great many others in the ſame calamity. Their creditors demanded indemnification from the ſociety at large; and on their refuſal to ſatiſfy them, brought their cauſe before the parliament of Paris. That body, eager to revenge themſelves on ſuch powerful adverſaries, carried on the moſt violent perſecutions every where againſt them. In the courſe of theſe, the volume containing the conſtitution and government of the order itſelf was appealed to, and produced in open court. It then appeared that the order of Jeſuits formed a diſtinct body in the ſtate, ſubmitting implicitly to their chief, who alone was abſolute over their lives and fortunes. It was likewiſe diſcovered that they had, after a former expulſion, been admitted into the kingdom upon conditions which they had never fulfilled; and to which their chief had obſtinately refuſed to ſubſcribe; conſequently that their exiſtence at that time in the nation was merely the effect of toleration. The event was that the writings of the Jeſuits were pronounced to contain doctrines ſubverſive of all civil government, and injurious to the ſecurity of the ſacred perſons of ſovereigns; the attempt of Damien againſt the king was attributed to them, and every thing ſeemed to prognoſticate their ſpeedy diſſolution. In this critical momant, however, the king interfered, and by his royal mandate ſuſpended all proceedings againſt them for a year; a plan of accommodation was drawn up, and ſubmitted to the pope and general of the order: but the latter, by his-ill timed haughtineſs, entirely overthrew the hope of reconciliation. The king withdrew his protection, and the parliament redoubled their efforts againſt them. The bulls, briefs, conſtitutions, and other regulations of the Society, were determined to be encroachments on authority, and abuſes of government; the ſociety itſelf was finally diſſolved, and its members declared incapable of holding any clerical or municipal offices; their colleges were ſeized; their effects confiſcated; and the order annihilated ever ſince.

164
Contentions betwixt the king and his parliaments.

The parliament having gained this victory, next made an attempt to ſet bounds to the power of the king himſelf. They now refuſed to regiſter an edict which Louis had iſſued for the continuance of ſome taxes which ſhould have ended with the war, and likewiſe to conform to another by which the king was enabled to redeem his debts at an inadequate price. The court attempted to get the edicts regiſtered by force, but the parliaments every where ſeemed inclined to reſiſt to the laſt. In 1766, the paliaments of Brittany refuſed the crown a gift of 700,000 livres; in conſequence of which they were ſingled out to bear the weight of royal vengeance; but while matters were on the point of coming to extremities, the king thought proper to drop the proceſs altogether, and to publiſh a general amneſty. The parliaments, however, now affected to deſpiſe the royal clemency; which exaſperated the king to ſuch a degree, that he ordered the counſellors of the parliament of Brittany (who had refuſed to reſume the functions of which he deprived them) to be included in the liſt of thoſe who were to be drafted for militia; and thoſe upon whom the lot fell were immediately obliged to join their reſpective regiments; the reſt being employed in forming the city-guard. The parliament of Paris remonſtrated ſo freely upon this conduct of the king, that they alſo fell under his cenſure; and Louis in the moſt explicit manner declared, that he would ſuffer no earthly power to interfere with his will; and the parliaments were for the preſent intimidated into ſubmiſſion.

The interval of domeſtic tranquillity which now took place, was employed by the king in humbling the pride of the pope, who refuſed to recal a brief he had publiſhed againſt the duke of Parma. On this the French monarch reclaimed the territories of Avignon and Venaiſſin; and when the pontiff denounced his unavailing cenſures againſt him, the marquis de Rochecouart, with a ſingle regiment of ſoldiers, drove out the troops of the pope, and took poſſeſſion of the territories in queſtion.

165
Iſland of Corſica reduced.

A more formidable oppoſition was made by the natives of the ſmall iſland of Corſica; the ſovereignty of which had been transferred to France by the Genoeſe its former maſters, on condition that Louis ſhould reinſtate them in the poſſeſſion of the iſland of Capraia, which the Corſicans had lately reduced. The iſlanders defended themſelves with the moſt deſperate intrepidity; and it was not till after ſome campaigns, in which ſeveral thouſands of the braveſt troops of France were loſt, that they could be brought under ſubjection.

166
Diſtreſſed ſtate of the nation.

The ſatiſfaction which this unimportant conqueſt might afford to Louis, was clouded by the diſtreſs of the nation at large. The Eaſt India Company had totally failed, and moſt of the capital commerical houſes in the kingdom were involved in the ſame calamity. The miniſter, the duc de Choiſeuil, by one deſperate ſtroke, reduced the intereſt of the funds to one half, and at the ſame time took away the benefit of the ſurvivorſhip in the tontines, by which the national credit was greatly affected; the altercation betwixt the king and his parliaments revived, and the diſſenſions became worſe than ever. The duc de Choiſeuil attempted in vain to conciliate the differences; his efforts tended only to bring miſfortunes upon himſelf, and in 1771 he was baniſhed by the king, who ſuſpected him of favouring the popular party too much; and this was ſoon after followed by the baniſhment of the whole parliament of Paris, and that by the baniſhment of a number of others; new parliaments being every where choſen in place of thoſe who had been expelled. The people were by no means diſpoſed to pay the ſame regard to theſe new parliaments that they had done to the old ones; but every appearance of oppoſition was at laſt ſilenced by the abſolute authority of the king. In the midſt of this plenitude of power, however, which he had ſo ardently deſired, his health daily declined, and the period of his days was evidently at no great diſtance. As he had all along indulged himſelf in ſenſual pleaſures to the greateſt exceſs, ſo now they proved the immediate means of his deſtruction. His favourite miſtreſs, Madame de Pompadour, who for a long time governed him with an abſolute ſway, had long ſince been dead, and the king had for ſome time been equally enſlaved by the charms of Madame du Barre. At laſt even her beauty proved inſufficient to excite deſire; and a ſucceſſion of miſtreſſes became neceſſary to rouſe the languid appetites of the king. One

167 Death of Louis XV.

of theſe who was infected with the ſmall-pox, communicated the diſeaſe to the king; who in a ſhort time died of it, notwithſtanding all the aſſiſtance that could be given him by the phyſicians.

168 Reign of Louis XVI.

The new king Louis XVI. grandſon to the former, aſcended the throne in the year 1774, in the 20th year of his age: and to ſecure himſelf againſt the diſeaſe which had proved fatal to his predeceſſor, ſubmitted to inoculation, with ſeveral others of the royal family. Their quick and eaſy recovery contributed much to extend that practice throughout the kingdom, and to remove the prejudices, which had been entertained againſt it.

The king had no ſooner regained his health, than he applied himſelf diligently to extinguiſh the differences which had taken place betwixt his predeceſſor and the people. He removed thoſe from their employments who had given cauſe of complaint by their abitrary and oppreſſive conduct; and he conciliated the affection of his ſubjects by removing the new parliaments and recalling the old ones.

But though the prudence of Louis had ſuggeſted to him theſe compliances, he endeavoured ſtill to preſerve pure and entire the royal authority. He explained his intentions by a ſpeech in the great chamber of parliament. "The ſtep that he had taken to enſure the tranquillity and happineſs of his ſubjects, ought not (he obſerved) to invalidate his own authority; and he hoped from the zeal and attachment of the preſent aſſembly, an example of ſubmiſſion to the reſt of his ſubjects. Their repeated reſiſtance to the commands of his grandfather had compelled that monarch to maintain his prerogative by their baniſhment; and they were now recalled, in the expectation that they would quietly exerciſe their functions, and diſplay their gratitude by their obedience." He concluded with declaring that it was his deſire to bury in oblivion all paſt grievances; that he ſhould ever behold with extreme diſapprobation whatever might tend to create diviſions and diſturb the general tranquillity; and that his chancellor would read his ordinance to the aſſembly, from which they might be aſſured he would not ſuffer the ſmalleſt deviation to be made." That ordinance was conceived in the moſt explicit terms, and was immediately regiſtered by the king's command. The articles of it limited within very narrow bounds the pretenſions of the parliament of Paris: The members were forbidden to look upon themſelves as one body with the other parliaments of the kingdom, or to take any ſtep, or aſſume any title, that might tend towards, or imply, ſuch an union; they were enjoined never to relinquiſh the adminiſtration of public juſtice, except in caſes of abſolute neceſſity, for which the firſt preſident was to be reſponſible to the king; and it was added, that on their diſobedience the Grand Council might replace the parliament, without any new edict for the purpoſe. They were ſtill, however, permitted to enjoy the right of remonſtrating before the regiſtering of any edicts or letters patent which they might conceive injurious to the welfare of the people, provided they preſerved in their repreſentations the reſpect due to the throne. But theſe remonſtrances were not to be repeated; and the parliament, if they proved ineffectual, were to regiſter the edict objected to within a month at fartheſt from the firſt day of its being publiſhed: They were forbidden to iſſue any arrets which might excite trouble, or in any manner retard the execution of the king's ordinances; and they were aſſured by the king himſelf, at the concluſion of this code for their future conduct, that as long as they adhered to the bounds preſcribed, they might depend upon his countenance and and protection. In ſhort, the terms on which Louis conſented to re-eſtabliſh the parliaments were ſuch, that they were reduced to mere cyphers, and the word of the king ſtill continued to be the only law in the kingdom. The archbiſhop of Paris, who had likewiſe preſumed to raiſe ſome commotions with regard to the bull Unigenitus, was obliged to ſubmit; and ſeverely threatened if he ſhould afterwards interfere in ſuch a cauſe.

1775.

The final conqueſt of the Corſicans, who provoked by the oppreſſion of their governors, had once more attempted to regain their former liberty, was the firſt event of importance which took place after this reſtoration of tranquillity: but the kingdom was yet filled with diſorder from other cauſes. A ſcarcity of corn happening to take place juſt at the time that ſome regulations had been made by M. Turgot the new financier, the populace roſe in great bodies, and committed ſuch outrages, that a military force became abſolutely neceſſary to quell them; and it was not till upwards of 500 of theſe miſerable wretches were deſtroyed that they could be reduced. The king, however, by his prudent and vigorous conduct on this occaſion, ſoon put a ſtop to all riots, and eminently diſplayed his clemency as well as prudence in the methods he took for the reſtoration of the public tranquillity.

169 Humane edict in favour of deſerters.

The humanity of Louis was next ſhown in an edict which he cauſed to be regiſtered in parliament, ſentencing the deſerters from his army in future to work as ſlaves on the public roads, inſtead of puniſhing them as formerly with death; and with equal attention to the general welfare of his ſubjects, he ſeized the moment of peace to fulfil thoſe promiſes of economy which on his acceſſion he had given to his people. Various regulations took place in conſequence; particularly the ſuppreſſion of the Muſquetaires and ſome other corps, which being adapted more to the parade of guarding the royal perſon than any real military ſervice, were ſupported at a great expence, without any adequate return of benefit to the ſtate.

270 Suppreſſion of the Muſquetaires.

Particular attention was alſo paid to the ſtate of the marine; and the appointment of M. de Sartine in 1776 to that department did honour to the penetration of the ſovereign. That miniſter, fruitful in reſources, and unwearied in his application, was inceſſantly engaged in augmenting the naval ſtrength of his country; and the various preparations that filled the ports and docks created no ſmall uneaſineſs to the Britiſh court.

171 Appointment of M Necker to the direction of the finances.

The next appointment made by the king was equally happy, and in one reſpect ſinglar and unprecedented. M. Turgot, though poſſeſſed of integrity and induſtry, had not been able to command the public confidence. On this retreat, M. Clugny, intendant general of Bourdeaux, had been elevated to the vacant poſt; but he dying in a very ſhort ſpace, M. Taboureau des Reaux was appointed his ſucceſſor; and the king ſoon after aſſociated with him in the management of the finances M. Necker, by birth a Swiſs, and by religion a Proteſtant. That gentleman, in the preceding reign, had been choſen to adjuſt ſome differences between the Eaſt India company and the crown; and had diſcharged his truſt in a manner which gained the approbation of both parties. Poſſeſſed of diſtinguiſhed abilities, his appointment would have excited no ſurpriſe, had it not been contrary to the conſtant policy of France, which had carefully excluded the aliens of her country and faith from the control of her revenue. It now ſtood forward as a new inſtance of enlargement of mind and liberality of ſentiment; and will to poſterity mark the prominent features of the reign of Louis XVI.

172
The French privately aſſiſt the Americans in their conteſt with Britain;

Although the French monarch was of a pacific diſpoſition, and not deſtitute of generoſity of ſentiment; yet his own and the public exultation had been openly and conſtantly proportioned to the ſucceſs of the Americans in their conteſt with Britain: the princes of the blood and the chief nobility were eager to embark in ſupport of the cauſe of freedom; and the prudence of the king and his moſt confidential miniſters alone reſtrained their ardour. The fatal events of the former war were ſtill impreſſed on the mind of Louis; and he could not readily conſent to expoſe his infant marine in a conteſt with a nation who had ſo frequently aſſerted the dominion of the ſeas, and ſo lately broken the united ſtrength of the houſe of Bourbon. At the ſame time, he was ſenſible that the opportunity of humbling thoſe haughty iſlanders ſhould not be entirely neglected, and that ſome advantages ſhould be taken of the preſent commotions in America. Two agents from the United States, Silas Deane and Dr Benjamin Franklin, had ſucceſſively arrived at Paris; and though all audience was denied them in a public capacity, ſtill they were privately encouraged to hope that France only waited the proper opportunity to vindicate in arms the independence of America. In the mean while, the American cruizers were hoſpitably received into the French ports; artillery and all kinds of warlike ſtores were freely ſold or liberally granted to the diſtreſs of the coloniſts; and French officers and engineers, with the connivance of government, entered into their ſervice.

Some changes were about this time introduced into the different departments of ſtate. The conduct of M. Necker in the finances had been attended with univerſal approbation; and M. Taboureau des Reaux, his colleague, had reſigned his ſituation, but ſtill retained the dignity of counſellor of ſtate. To afford full ſcope to the genius of M. Necker, Louis determined no longer to clog him with an aſſociate; but, with the title of Director-general of the Finances, ſubmitted to him the entire management of the funds and revenue of France. In the enſuing year, the count de St Germains, ſecretary at war, died; and the prince de Montbarey, who had already filled an inferior ſituation in that department, was now appointed to ſucceed him.

In the mean time, Louis's negociations with foreign courts were not neglected. He concluded a new treaty of alliance with Switzerland: vigilantly obſerved the motions of the different princes of Germany on the death of the elector of Bavaria; and when cloſely queſtioned by the Engliſh ambaſſador Lord Stormont, reſpecting the various warlike preparations which were diligently continued through the kingdom, he replied, That at a time when the ſeas were covered with Engliſh fleets and American cruizers, and when ſuch armies were ſent to the New World as had never before appeared there, it became prudent for him alſo to arm for the ſecurity of the colonies and the protection of the commerce of France. The king was not ignorant at the ſame time, that the remonſtrances of Great Britain, and the importunities of the agents of the United States, would ſoon compel him to adopt ſome deciſive line of conduct. This was haſtened by a new event diſaſtrous to Britain; the failure of general Burgoyne's expedition, and the capture of his army. The news of that event was received at Paris with unbounded exultation. M. Sartine, the marine ſuperintendant, was eager to meaſure the naval ſtrength of France with that of Great Britain; the queen, who had long ſeconded the applications of the American agents, now eſpouſed their cauſe with freſh ardour; and the pacific inclinations of Louis being overborne by the ſuggeſtions of his miniſters and the influence of his queen, it was at length determined openly to acknowledge the independence of the United States.

173
And at laſt openly acknowledge the independence of the United States.

Dr Franklin and Silas Deane, who had hitherto acted as private agents, were now acknowledged as public ambaſſadors from thoſe ſtates to the court of Verſailles; and a treaty of amity and commerce was ſigned between the two powers in the month of February 1778. The duke of Noailles, ambaſſador to the court of London, was in the month of March inſtructed to acquaint that court with the above treaty. At the ſame time he declared, that the contracting parties had paid great attention not to ſtipulate any excluſive advantages in favour of France, and that the United States had reſerved the liberty of treating with every nation whatever on the ſame footing of equality and reciprocity. But this ſtipulation was treated by the Britiſh with contempt; and the recal of Lord Stormont, their ambaſſador at Verſailles, was the ſignal for the commencement of hoſtilities.—The events produced by this war are related under the articles AMERICA, BRITAIN, and INDOSTAN. Here our chief buſineſs is with domeſtic tranſactions, the meaſures of the cabinet, and the internal economy of the ſtate.

174
Removal of M. de Sartine.

In the year 1780, new changes in the French miniſtry took place. M. Bertin had reſigned the office of ſecretary of ſtate; the prince de Montbarey had retired from the poſt of ſecretary at war, and was ſucceeded by the marquis de Segur. But the moſt important removal was that of M. Sartine, who had for ſeveral years preſided over the marine department, and whoſe unwearied application and ability had raiſed the naval power of France to a height that aſtoniſhed Europe; but his colleagues in the cabinet loudly accuſed a profuſion, which would have diverted into one channel the whole reſources of the kingdom; and his retreat opened a road to the ambition of the marquis de Caſtries, who was appointed to ſupply his place.

This year, the king fixed on the anniverſary of his birth-day to render it memorable by a new inſtance of humanity; and he aboliſhed for ever the inhuman cuſtom of *putting the queſtion*, as it was called, by torture; a cuſtom which had been ſo eſtabliſhed by the practice of ages, that it ſeemed to be an inſeparable part of the conſtitution of the courts of Juſtice in France. At the ſame time to defray the charges of war, he continued to diminiſh his own expenditure; and ſacrificing his magnificence to the eaſe of his ſubjects, diſmiſſed at once above 400 officers belonging to his court.

Unhappily, however, the popular diſcontents were excited next year by the diſmiſſion of their favourite miniſter M. Necker. He had conceived the arduous but popular project of ſupporting a war by loans without taxes; and the rigid economy which he had introduced into all the departments of the royal houſehold, and the various reſources that preſented themſelves to his fertile genius, had ſupported him amidſt the difficulties that attended this ſyſtem. But his auſterity of temper had not rendered him equally acceptable to the ſovereign and his ſubjects; and the repeated reforms he had recommended were repreſented as inconſiſtent with the dignity of the crown: he was therefore in 1781 diſmiſſed from his office of comptroller-general; and M. Joli de Fleuri, counſellor of ſtate, was appointed to that important department. The defeat of the count de Graſſe happened next year, and impreſſed the kingdom with general grief and conſternation. Immenſe preparations were, however, made for the operations of 1783; and in conjunction with the courts of Madrid and the Hague, Louis was determined this year to make the moſt powerful efforts to bring the war to a concluſion. But in the midſt of theſe preparations, the voice of peace was again heard; and Louis was induced to liſten to the proffered mediation of the two firſt potentates in Europe, the emperor of Germany and the empreſs of Ruſſia. The count de Vergennes, who ſtill occupied the poſt of ſecretary of foreign affairs, was appointed to treat with Mr Fitzherbert the Britiſh miniſter at Bruſſels; but who had lately proceeded to Paris to conduct this important negociation. The way was already ſmoothed for the reſtoration of the public tranquillity, by proviſional articles ſigned at the concluſion of the laſt year between the States of America and Great Britain, and which were to conſtitute a treaty of peace finally to be concluded when that between France and Great Britain took place. Preliminary articles were accordingly agreed upon and ſigned at Verſailles: theſe were ſoon after ſucceeded by a definitive treaty; and France, throughout her extenſive dominions, beheld peace once more eſtabliſhed. Though the late war had been attended by the moſt brilliant ſucceſs, and the independence of America ſeemed to ſtrike deep at the ſource of her rival's power, yet France herſelf had not been entirely free from inconvenience. The retreat of M. Necker had, as we have already obſerved, diminiſhed the public confidence; three different perſons who had ſince tranſiently occupied his poſt, increaſed the jealouſies of the people; and the failure of the celebrated Caiſſe d'Eſcompte completed the univerſal conſternation.

176
Peace concluded.

177
Of the Caiſſe d'Eſcompte

That bank had been eſtabliſhed in the year 1776. The plan of it was formed by a company of private adventurers, and its capital was fixed at L.500,000 Sterling. The profeſſed deſign of the Company was to diſcount bills at ſhort dates, at the rate of four *per. cent. per annum*: but as this intereſt could never be an equivalent for the capital ſunk by the proprietors, they were entruſted with the additional power of iſſuing notes to the amount of their capital, which, as they were capable at any time of being converted into ſpecie, might be often voluntarily taken by their cuſtomers from mere convenience. The reputation of the bank ſoon cauſed its ſtock to ſell above par; and its credit was ſtill at the higheſt, when to the aſtoniſhment of the nation it ſuddenly ſtopped payment on the 2d of October 1783. The cauſe aſſigned was an uncommon ſcarcity of ſpecie: But the public ſuſpected that the failure aroſe from a loan ſecretly made to government; and what confirmed the ſuſpicion was, that government about the ſame time ſtopped payment of the bills drawn upon them by their army in America.

Whatever was the cauſe of this event, the king was prevailed on to extend his protection to the company. By four ſucceſſive edicts the banks in Paris were ordered to receive the notes of the Caiſſe d'Eſcompte as currency; and a lottery with a ſtock of one million Sterling, redeemable in eight years, being eſtabliſhed, the tickets were made purchaſable in notes of the Caiſſe d'Eſcopte. By theſe expedients the public confidence in that bank was revived, its buſineſs increaſed, and its ſtock roſe to above double the original ſubſcription; the bills from America were at the ſame time put in a train of payment, and public credit was reſtored throughout the kingdom. Some compenſation alſo for the expences that had been incurred during the late war, was drawn from a treaty with the United States of America. Theſe engaged to reimburſe France in the ſum of 18 million of livres, which had been advanced in the hour of their diſtreſs; and Louis conſented to receive the money, as more convenient to the States, in the ſpace of 12 years, by 12 equal and annual payments.

178
Treaty between France and Holland.

The general peace was ſoon after followed by a particular treaty between France and Holland, which was effected with great addreſs by the Count de Vergennes. It included all the principles which can ſerve to cement in the cloſeſt union diſtinct nations under diſtinct governments; and by which they may mutually participate, in peace or in war, of good or of evil; and in all caſes adminiſter the moſt perfect, aid, counſel, and ſuccour to each other. It alſo preſcribed, if their united good offices for the preſervation of peace ſhould prove ineffectual, the aſſiſtance they were to afford each other by ſea and land. France was to furniſh Holland with 10,000 effective infantry, 2000 cavalry, with 12 ſhips of the line and 6 frigates. Their High Mightineſſes, on the other ſide, in caſe of a marine war, or that France ſhould be attacked by ſea, were to contribute to her defence ſix ſhips of the line and three frigates; and in caſe of an attack on the territory of France, the States-general were to have the option of furniſhing their land contingent either in money or troops, at the eſtimate of 5000 infantry and 1000 cavalry. Further, if the ſtipulated ſuccours ſhould be inſufficient for the defence of the party attacked, or for procuring a proper peace, they engaged to aſſiſt each other with all their forces, if neceſſary; it being however agreed that the contingent of troops to be furniſhed by the States-general ſhould not exceed 20,000 infantry and 4000 cavalry. It was further added, that neither of the contracting powers ſhould diſarm, or make or receive propoſals of peace or truce, without the conſent of the other: they promiſed alſo not to contract any future alliance or engagement whatever,

ever, directly or indirectly, contrary to the preſent treaty; and on any treaties or negociations being propoſed which might prove detrimental to their joint intereſt, they pledged their faith to give notice to each other of ſuch propoſals as ſoon as made.

Thus was Holland now converted into the firm ally of that power againſt whoſe encroaching ſpirit ſhe had formerly armed the moſt powerful kingdoms in Europe; while France having aſſerted the independence of America againſt Great-Britain, and having converted an ancient and formidable foe into an uſeful friend, ſeemed to have attained an influence over the nations of the earth that ſhe had never before been poſſeſſed of.

179
Conſequence to France from her interference between Britain and her colonies.

But however exalted her preſent ſituation might appear, the ſeeds of future commotion were already apparent to an attentive obſerver. The applauſe that had attended the parliament of Paris in their ſtruggles with the late king might be conſidered as the firſt dawn of freedom; the language of that aſſembly had boldly inculcated to their countrymen their natural rights, and taught them to look with a leſs enraptured eye on the luſtre that encompaſſed the throne. The war in America had contributed to enlarge the political ideas of the French: they had on that occaſion ſtood forth as the champions of liberty, in oppoſition to regal power; and the officers who had acted on that conſpicuous theatre, accuſtomed to think and ſpeak without reſtraint, on their return imparted to the provinces of France the flame of freedom which had been kindled in the wilds of America. From that moment the French, inſtead of ſilently acquieſcing under the edicts of their ſovereign, canvaſſed each action with bold and rigid impartiality; while the attachment of the army, which has ever been conſidered as the ſole foundation of deſpotiſm, gave way to the noble enthuſiaſm of liberty.

180
Appointment and meaſures of M. de Calonne.

We have already noticed the public diſſatisfaction that had attended the diſmiſſion of M. Necker; his tranſient ſucceſſor, M. de Fleury, had retired from the management of the finances in 1783, and the more tranſient adminiſtration of M. d'Ormeſſon had expired in the ſame year that gave it birth. On his retreat, M. de Calonne, who had ſucceſſively filled with acknowledged reputation the office of intendant of Mentz, and afterwards of the provinces of Flanders and Artois, was nominated to the poſt of comptroller-general. This gentleman, flexible and inſinuating, eloquent in converſation and poliſhed in his manners, fertile in reſources and liberal in the diſpoſal of the public money, ſoon rendered himſelf acceptable to the ſovereign. But he did not enter upon his new and arduous ſtation favoured by the breath of popularity: he was reported to be more able than conſiſtent, and not to have tempered the ardour of his ſpirit by the ſeverity of deep reſearch; and the people, amidſt repeated loans, regretted that ſevere ſimplicity which had characteriſed the adminiſtration of M. Necker.

It was the bold and judicious meaſures of Calonne, however, that reſtored credit to the Caiſſe d'Eſcompte, which had ſtopped payment a few weeks before his acceſſion. His next meaſure in 1784, the eſtabliſhment of the Caiſe d'Amortiſſement or ſinking fund, was intitled to a ſtill higher degree of applauſe. The plan of that fund was ſimple and moderate: It was to pay annually by government, into the hands of a board ſet apart for that purpoſe, the entire intereſt of the national debts, whether in ſtock or annuities, together with an additional ſum of L. 120,000. The annuities that would be extinguiſhed every year were eſtimated at L. 50,000; and in that proportion, the ſum ſet apart for the redemption of the national debt would annually increaſe. The operation of this new fund was limited to the term of 25 years; and during that term the annual receipt of the Caiſſe d'Amortiſſement is declared unalterable, and incapable of being diverted to any other object.

The principal meaſure of the next year was the eſtabliſhment of a new Eaſt India Company, the conſtitutions of which have been already detailed in a preceding volume of this work, under the article COMPANY; ſee Vol. V. p. 247, 248: A meaſure not equally commendable with the preceding, and which did not fail to excite violent complaints. The time, however, was now approaching, when the neceſſities of the ſtate would compel him to meaſures ſtill more unpopular, and deſtined to undergo a ſeverer ſcrutiny. Although peace had been re-eſtabliſhed throughout Europe for three years, yet the finances of France ſeemed ſcarce affected by this interval of tranquillity, and it was found requiſite to cloſe every year with a loan. The public expenditure of 1785 might probably ſeem to ſanction this meaſure. It had been thought proper to fortify Cherbourg upon a large and magnificent ſcale; the claim of the emperor to the navigation of the Scheldt, had obliged the French to increaſe their land forces, either to form a reſpectable neutrality, or to aſſiſt effectually their Dutch allies; and the marquis de Caſtries, fond of war and profuſe in his deſigns, had not ſuffered the navy, which M. Sartine had ſurrendered into his hands, to decline during the interval of peace. The treaty of commerce concluded in the year 1786 with Great Britain was a new ſource of diſcontent. Though regarded by the Engliſh manufacturers as far from advantageous, it excited in France ſtill louder murmurs. It was repreſented as likely to extinguiſh thoſe infant eſtabliſhments, which were yet unable to vie with the manufactures of England that had attained to maturity; and the market that it held out for the wines and oils of France was paſſed over in ſilence, while the diſtreſs of the artiſan was painted in the moſt ſtriking colours. But when the edict for regiſtering the loan at the concluſion of the laſt year, and which amounted to the ſum of three millions three hundred and thirty thouſand pounds, was preſented to the parliament of Paris, the murmurs of the people, through the remonſtrances of the aſſembly, aſſumed a more legal and formidable aſpect. The king, however, ſignified to the ſelect deputation that were commiſſioned to convey to him their remonſtrances, that he expected to be obeyed without farther delay. The ceremony of the regiſtering accordingly took place on the next day; but it was accompanied with a reſolution, importing, "that public economy was the only genuine ſource of abundant revenue, the only means of providing for the neceſſities of the ſtate, and reſtoring that credit which borrowing had reduced to the brink of ruin."

The king was no ſooner informed of this ſtep, than he commanded the attendance of the grand deputation of parliament; when he eraſed from their records the reſolution that had been adopted; and obſerved, that though it was his pleaſure that the parliament ſhould communicate, by its reſpectful repreſentations, whatever might concern the good of the public, yet he never would allow them ſo far to abuſe his clemency as to erect themſelves into the cenſors of his government. At the ſame time, more ſtrongly to mark his diſpleaſure at their expoſtulations, he ſuperſeded one of their officers, who had appeared moſt active in forwarding the obnoxious reſolution.

M. de Calonne, however, though gratified by the approbation of his ſovereign, could not but feel himſelf deeply mortified by the oppoſition of the parliament. His attempts to conciliate that aſſembly had proved ineffectual; and he experienced their inflexible averſion at the critical juncture when their acquieſcence might have proved of the moſt eſſential ſervice. An anxious inquiry into the ſtate of the public finances had convinced him that the expenditure by far exceeded the revenue. In this ſituation, to impoſe new taxes was impracticable; to continue the method of borrowing was ruinous; to have recourſe only to economical reforms, would be found totally inadequate; and he heſitated not to declare, that it would be wholly impoſſible to place the finances on a ſolid baſis, but by the reformation of whatever was vicious in the conſtitution of the ſtate.

To give weight to this reform, M. de Calonne was ſenſible that ſomething more was neceſſary than the royal authority; he perceived that the parliament was neither a fit inſtrument for introducing a new order into public affairs, nor would ſubmit to be a paſſive machine for ſanctioning the plans of a miniſter, even if thoſe plans were the emanations of perfect wiſdom. Though originally a body of lawyers, indebted for their appointments to the king, there was not an attribute of genuine legiſlative aſſembly but what they ſeemed deſirous to engroſs for themſelves; and they had been ſupported in their pretenſions by the plaudits of the people, who were ſenſible that there was no other body in the nation that could plead their cauſe againſt royal or miniſterial oppreſſion. To ſuppreſs, therefore, the only power of control that remained, and to render the government more arbitrary, was deemed too perilous a meaſure: yet to leave the parliament in the full poſſeſſion of their influence, an influence that the miniſter was convinced would be exerted againſt him, was at once to render his whole ſyſtem abortive.

181 Aſſembly of the Notables.

In this dilemma, the only expedient that ſuggeſted itſelf was to have recourſe to ſome other aſſembly, more dignified and ſolemn in its character, and which ſhould in a greater degree conſiſt of members from the various orders of the ſtate and the different provinces of the kingdom. This promiſed to be a popular meaſure; it implied a deference to the people at large, and might be expected to prove highly acceptable. But the true and legitimate aſſembly of the nation, the ſtates-general, had not met ſince the year 1614; nor could the miniſter flatter himſelf with the hope of obtaining the royal aſſent to a meeting which a deſpotic ſovereign could not but regard with ſecret jealouſy. Another aſſembly had occaſionally been ſubſtituted in the room of the ſtates-general: this was diſtinguiſhed by the title of the *Notables*; and conſiſted of a number of perſons from all parts of the kingdom, chiefly ſelected from the higher orders of the ſtate, and nominated by the king himſelf. This aſſembly had been convened by Henry IV. again by Louis XIII. and was now once more ſummoned by the authority of the preſent monarch.

The writs for calling them together were dated on the 29th of December 1786; and they were addreſſed to ſeven princes of the blood, nine dukes and peers of France, eight field-mareſchals, twenty-two nobles, eight counſellors of ſtate, four maſters of requeſts, eleven archbiſhops and biſhops, thirty-ſeven of the heads of the law, twelve deputies of the *pays d'etats*, the lieutenant civil, and twenty-five magiſtrates of the different towns of the kingdom. The number of members was 144; and the 29th of January 1787 was the period appointed for their meeting.

Upon the arrival of the notables at Paris, however, the miniſter found himſelf yet unprepared to ſubmit his ſyſtem to their inſpection, and poſtponed the opening of the council to the 7th of February. A ſecond delay to the 14th of the ſame month was occaſioned by the indiſpoſition of M. de Calonne himſelf and that of the count de Vergennes preſident of the council of finance and firſt ſecretary of ſtate; and a third procraſtination was the neceſſary reſult of the death of the count on the day previous to that fixed for the opening of the meeting. He was ſucceeded in the department of foreign affairs by the count de Montmorin, a nobleman of unblemiſhed character. But his loſs at this critical juncture was ſeverely felt by M. de Calonne; he alone, of all the miniſters, having entered with warmth and ſincerity into the plans of the comptroller-general. The chevalier de Miromeſnil, keeper of the ſeals, was avowedly the rival and enemy of that ſtateſman. The mareſchal de Caſtries, ſecretary for the marine department, was perſonally attached to M. Necker; and the baron de Breteuil, ſecretary for the houſehold, was the creature of the queen, and deeply engaged in what was called the Auſtrian ſyſtem.

182 Splendid project of M. de Ca lonne.

It was under theſe difficulties that M. de Calonne, on the 22d of February, firſt met the aſſembly of the Notables, and opened his long expected plan. He began by ſtating, that the public expenditure had for centuries paſt exceeded the revenue, and that a very conſiderable deficiency had of courſe exiſted; that the Miſſiſſippi ſcheme of 1720 had by no means, as might have been expected, reſtored the balance; and that under the economical adminiſtration of cardinal Fleury the deficit ſtill exiſted; that the progreſs of this derangement under the laſt reign had been extreme; the deficiency amounting to three milions ſterling at the appointment of the abbé Terray; who, however, reduced it to one million ſix hundred and ſeventy-five thouſand pounds; it decreaſed a little under the ſhort adminiſtration that followed, but roſe again in conſequence of the war, under the adminiſtration of M. Necker; and at his own acceſſion to the office, it was three millions three hundred and thirty thouſand pounds.

In order to remedy this growing evil, M. Calonne recommended a territorial impoſt, in the nature of the Engliſh land-tax, from which no rank or order of men were to be exempted; and an enquiry into the poſſeſſions of the clergy, which, hitherto had been deemed ſacred from their proportion of the public burdens; the various branches of internal taxation were alſo to undergo a ſtrict examination; and a conſiderable reſource was preſented in mortgaging the demeſne lands of the crown.

The very neceſſity for theſe reforms was combated with a degree of boldneſs and force of reaſoning that could not fail of deeply impreſſing the aſſembly; and inſtead of meeting with a ready acquieſcence, the comptroller-general was now launched into the boundleſs ocean of political controverſy. M. Necker, previous to his retirement, had publiſhed his Compte rendu au Roi, in which France was repreſented as poſſeſſing a clear ſurplus of 425,000 pounds ſterling: this performance had been read with avidity, and probably contributed to eſtrange from the author the royal countenance; but the credit of it was ably vindicated by M. de Brienne, archbiſhop of Thoulouſe.

183
Oppoſed by Mirabeau and the biſhop of Thoulouſe;

M. de Calonne met with a ſtill more formidable adverſary in the count de Mirabeau. This extraordinary man, reſtleſs in his diſpoſition, licentious in his morals, but bold, penetrating, and enterpriſing, had occaſionally viſited every court in Europe. He had been admitted at one time to the confidence of the miniſter; and had been directed, though in no oſtenſible character, to obſerve at Berlin the diſpoſition of the ſucceſſor of the great Frederic: in this capacity, he was frequently expoſed to neglect and diſappointment; his letters were often left unanſwered; diſguſt ſucceeded to admiration; and he who had entered the Pruſſian court the intimate friend, returned to Paris the avowed enemy, of M. de Calonne: while the archbiſhop arraigned the underſtanding, the count impeached the integrity, of the comptroller-general.

184
And by the principal nobility, clergy, and magiſtrates.

The eloquence of M. de Calonne, however, might have ſucceſsfully vindicated his ſyſtem and reputation, againſt the calculations of Brienne, and the invectives of Mirabeau; but he could not ſupport himſelf againſt the influence of the three great bodies of the nation. The ancient nobility and the clergy had ever been free from all public aſſeſſments; and had the evil gone no farther, it might have been ſtill perhaps borne with patience; but through the ſhameful cuſtom of ſelling patents of nobility, ſuch crowds of new nobleſſe ſtarted up, that every province in the kingdom was filled with them. The firſt object with thoſe who had acquired fortunes rapidly, was to purchaſe a patent; which, beſides gratifying their vanity, afforded an exemption to them and their poſterity from contributing proportionably to the exigences of the ſtate; the magiſtracies likewiſe throughout the kingdom, enjoyed their ſhare of theſe exemptions; ſo that the whole weight of the taxes fell on thoſe who were leaſt able to bear them.

The miniſter's deſign, then, of equaliſing the public burdens, and by rendering the taxes general diminiſhing the load borne by the lower and moſt uſeful claſſes of people, though undoubtedly great and patriotic, at once united againſt him the nobility, the clergy, and the magiſtracy; and the event was ſuch as might be expected: the intrigues of thoſe three bodies raiſed againſt him ſo loud a clamour, that, finding it impoſſible to ſtem the torrent, he not only reſigned his place on the 12th of April, but ſoon after retired to England from the ſtorm of perſecution.

185
Upon which M. de Calonne reſigns.

186
Diſturbances in Holland.

In the midſt of theſe tranſactions at home, Louis's attention was alſo called to the ſtate of affairs in the republic of Holland, his new and cloſe ally. The prince of Orange had been ſtripped of all authority by the ariſtocratic party; and, retiring from the Hague, maintained the ſhadow of a court at Nimeguen. His brother-in-law, however, the new king of Pruſſia, exerted his endeavours to promote the intereſt of the ſtadtholder; and having offered, in concert with France, to undertake the arduous taſk of compoſing the differences which diſtracted the republic, the propoſal was received with apparent cordiality by the court of Verſailles. At the ſame time it could ſcarce be expected that France would become the inſtrument of reſtoring the prince of Orange to that ſhare of power which he had before occupied, and thus abandon one of the longeſt and moſt favourite objects of her policy, the eſtabliſhing a ſupreme and permanent controul in the affairs of Holland. In fact, the conditions which were framed by the Louveſtein faction, as the baſis of reconciliation, were ſuch as plainly indicated their deſign to reduce the influence and authority of the ſtadtholder within very narrow limits. On his renouncing the right of filling up the occaſional vacancies in the town-ſenates, he was to be reſtored to the nominal office of captain-general: but he was to be reſtrained from marching the troops into, or out of any province, without leave from the reſpective provinces concerned; and he was alſo to ſubſcribe to a reſolution paſſed ſome time before by the ſenate of Amſterdam, that the command ſhould at all times be revocable at the pleaſure of the ſtates. Had the prince acquieſced in theſe preliminaries, France would have completely attained the object of her long negociations, and by means of the Louveſtein faction have acquired the aſcendency that ſhe had repeatedly ſought in the councils of Holland. But under the difficulties that ſurrounded him, the prince of Orange was admirably ſupported and aſſiſted by the genius, the ſpirit, and the abilities of his conſort: ſhe firmly rejected every meaſure tending to abridge any rights that had been attached to the office of ſtadtholder; and M. de Rayneval, the French negociator, having in vain endeavoured to overcome her reſolution, broke off the correſpondence between the Hague and Nimeguen, and returned to Paris about the middle of January 1787.

187
Attempts of the French to ſupport the republican party.

The events that enſued will be found detailed under a ſubſequent article. It is only neceſſary to obſerve in this place, that the republican party were totally diſappointed in their hopes from France. The court of Verſailles had indeed long truſted to the natural ſtrength of the republican party, and had been aſſiduous during the whole ſummer in endeavouring to ſecond them by every ſpecies of ſuccours that could be privately afforded. Crowds of French officers arrived daily in Holland; and either received commiſſions in the ſervice of the ſtates, or acted as volunteers in their troops. Several hundreds of tried and experienced ſoldiers were ſelected from different regiments; and being furniſhed with money for their journey, and aſſurances of future favour, were diſpatched in ſmall parties to join the troops, and help to diſcipline the burghers and volunteers. A conſiderable corps of engineers were alſo directed to proceed ſilently and in diſguiſe towards Amſterdam, and to aſſiſt in ſtrengthening the works of that city. Theſe aids, which might have proved effectual had the conteſt been confined to the ſtates of Holland and the ſtadtholder, were overwhelmed in the rapid invaſion of the Pruſſians; and the court of Berlin had taken its meaſures with ſo much celerity, and the ſituation of the republicans was already become ſo deſperate, that it was doubtful whether their affairs could be reſtored by any aſſiſtance that France was capable of immediately adminiſtering. Yet on Great Britain fitting out a ſtrong ſquadron of men of war at Portſmouth to give confidence to the operations of the king of Pruſſia, the court of Verſailles alſo ſent orders to equip 16 ſail of the line at Breſt, and recalled a ſmall ſquadron which had been commiſſioned on a ſummer's cruiſe on the coaſt of Portugal. But in theſe preparations Louis ſeemed rather to regard his own dignity, than to be actuated by any hopes of effectually relieving his allies. All oppoſition in Holland might be already conſidered as extinguiſhed. The ſtates aſſembled at the Hague had officially notified to the court of Verſailles, that the diſputes between them and the ſtadtholder were now happily terminated; and as the circumſtances which gave occaſion for their application to that court no longer exiſted, ſo the ſuccours which they had then requeſted would now be unneceſſary.

Under theſe circumſtances, France could only wiſh to extricate herſelf from her preſent difficulty with honour. She therefore readily liſtened to a memorial from the Britiſh miniſter at Paris; who propoſed, in order to preſerve the good underſtanding between the two crowns, that all warlike preparations ſhould be diſcontinued, and that the navies of both kingdoms ſhould be again reduced to the footing of a peace eſtabliſhment. This was gladly acceded to by the court of Verſailles; and that harmony which had been tranſiently interrupted between the two nations was reſtored.

181
Domeſtic concerns of France.

Though the French king could not but ſenſibly feel the mortification of thus relinquiſhing the aſcendency which he had attained in the councils of Holland, the ſtate of his own domeſtic concerns and the internal ſituation of his kingdom furniſhed matter for more ſerious reflection. The diſmiſſion of M. de Calonne had left France without a miniſter, and almoſt without a ſyſtem; and though the king bore the oppoſition of the Notables with admirable temper, yet the diſappointment that he had experienced ſunk deep into his mind. Without obtaining any relief for his moſt urgent neceſſities, he perceived too late that he had opened a path to the reſtoration of the ancient conſtitution of France, which had been undermined by the crafty Louis XI. and had been nearly extinguiſhed by the daring and ſanguinary counſels of Richlieu under Louis XIII. The Notables had indeed demeaned themſelves with reſpect and moderation, but at the ſame time they had not been deficient in firmneſs. The appointment of the archbiſhop of Thoulouſe, the vigourous adverſary of M. de Calonne, to the office of comptroller-general, probably contributed to preſerve the appearance of good humour in that aſſembly; yet the propoſed territorial impoſt, or general land tax, which was an object ſo ardently coveted by the court, was rejected. Louis, therefore, deprived of any farther hope of rendering the convention ſubſervient to his embarraſſments, determined to diſſolve the aſſembly; which he accordingly did, with a very moderate and conciliatory ſpeech to the members on their diſmiſſion.

189
Aſſembly of the Notables diſſolved.

190
Refuſal of the parliament to regiſter the new taxes.

Thus diſappointed of the advantage which he had flattered himſelf he would have drawn from the acquieſcence of the Notables, the king was obliged now to recur to the uſual mode of raiſing money by the royal edicts; among the meaſures propoſed for which purpoſe were the doubling the poll-tax, the re-eſtabliſhment of the third twentieth, and a ſtamp-duty. But the whole was ſtrongly diſapproved by the parliament of Paris; and that aſſembly, in the moſt poſitive terms, refuſed to regiſter the edict. Louis was obliged to apply, as the laſt reſort, to his abſolute authority; and, by holding what is called *a bed of juſtice,* compelled them to inroll the impoſt.

The parliament, though defeated, were far from ſubdued; and on the day after the king had held his bed of juſtice, they entered a formal proteſt againſt the edict; declaring, "that it had been regiſtered againſt their approbation and conſent, by the king's expreſs command; that it neither ought nor ſhould have any force; and that the firſt perſon who ſhould preſume to attempt to carry it into execution, ſhould be adjudged a traitor, and condemned to the gallies." This ſpirited declaration left the king no other alternative, than either proceeding to extremities in ſupport of his authority, or relinquiſhing for ever after the power of raiſing money upon any occaſion without the conſent of the parliament. Painful as every appearance of violence muſt have proved to the mild diſpoſition of Louis, he could not conſent to ſurrender, without a ſtruggle, that authority which had been ſo long exerciſed by his predeceſſors. Since the commencement of the preſent diſcontents, the capital had been gradually filled with conſiderable bodies of troops; and about a week after the parliament had entered the proteſt, an officer of the French guards, with a party of ſoldiers, went at break of day to the houſe of each individual member, to ſignify to him the king's command, that he ſhould immediately get into his carriage, and proceed to Troyes, a city of Champagne, about 70 miles from Paris, without writing or ſpeaking to any perſon out of his own houſe before his departure. Theſe orders were ſerved at the ſame inſtant; and before the citizens of Paris were acquainted with the tranſaction, their magiſtrates were already on the road to their place of baniſhment.

191
The members baniſhed.

Previous to their removal, however, they had preſented a remonſtrance on the late meaſures of government, and the alarming ſtate of public affairs. In ſtating their opinion on taxes, they declared, that neither the parliaments, nor any other authority, excepting that of the three eſtates of the kingdom collectively aſſembled, could warrant the laying of any permanent tax upon the people; and they ſtrongly enforced the renewal of thoſe national aſſemblies, which had rendered the reign of Charlemagne ſo great and illuſtrious.

This requiſition of the parliaments to re-eſtabliſh the national council, or ſtates-general, was the more honourable, as the former aſſemblies muſt have ſunk under the influence of the latter, and returned to their original condition of mere regiſters and courts of law. The confidence and attachment of the people of conſequence roſe in proportion to this inſtance of diſintereſtedneſs; their murmurs were openly expreſſed in the ſtreets of the capital, and the general diſſatisfaction was augmented by the ſtop that was put to public buſineſs by the exile of the parliament.

The cabinet at the ſame time was apparently weak, diſunited, and fluctuating; and continual changes took place in every department of the ſtate. Louis, averſe to rigorous counſels, wiſhed to allay the growing diſcontent by every conceſſion that was conſiſtent with his dignity; but it was generally believed, that the queen ſtrongly diſſuaded him from any ſtep that might tend to the diminution of the royal authority. The influence of that princeſs in the cabinet was undoubtedly great: but the popularity which once had accompanied her was no more: and ſome imputations of private levity, which had been rumoured through the capital, were far from rendering her acceptable to the majority of the people; while the count d'Artois, the king's brother, who had expreſſed himſelf in the moſt unguarded terms againſt the conduct of the parliament, ſtood expoſed to all the conſequences of popular hatred.

Nor was it only in the capital that the flame of liberty once more burſt forth; it blazed with equal ſtrength in the provincial parliaments. Among various inſtances of this nature, the parliament of Grenoble paſſed a decree againſt *letters de cachet*, the moſt odious engine of arbitrary power; and declared the execution of them within their juriſdiction, by any perſon, and under whatever authority, to be a capital crime.

The king had endeavoured to ſoothe the Pariſians by new regulations of œconomy, and by continual retrenchments in his houſehold: but theſe inſtances of attention, which once would have been received with the loudeſt acclamations, were now diſregarded under their affliction for the abſence of their parliament. 192 Recalled. His majeſty, therefore, in order to regain the affections of his ſubjects, conſented to reſtore that aſſembly; abandoning at the ſame time the ſtamp-duty and the territorial impoſt, which had been the ſources of diſpute. Theſe meaſures were, however, inſufficient to eſtabliſh harmony between the court and the parliament. The neceſſities of the ſtate ſtill continued; nor could the deficiency of the revenue be ſupplied but by extraordinary reſources, or a long courſe of rigid frugality. About the middle of November 1787, in a full meeting of the parliament, attended by all the princes of the blood, and the peers of France, the king entered the aſſembly, and propoſed two edicts for their approbation: one was for a new loan of 450 millions, near 19 millions ſterling: the other was for the re-eſtabliſhment of the Proteſtants in all their ancient civil rights; a meaſure which had long been warmly recommended by the parliament, and which was probably now introduced to procure a better reception to the loan.

On this occaſion, the king delivered himſelf in a ſpeech of uncommon length, filled with profeſſions of regard for the people, but at the ſame time ſtrongly expreſſive of the obedience he expected to his edicts. Louis probably imagined, that the dread of that baniſhment from which the members had been ſo lately recalled, would have enſured the acquieſcence of the aſſembly; but no ſooner was permiſſion announced for every member to deliver his ſentiment, than he was convinced that their ſpirits remained totally unſubdued. An animated debate took place, and was continued for nine hours; when the king, wearied by perpetual oppoſition, and chagrined at ſome freedoms uſed in their debates, ſuddenly roſe, and commanded the edict to be regiſtered without further delay. 193 Oppoſe the edict for a loan. This meaſure was moſt unexpectedly oppoſed by the duke of Orleans firſt prince of the blood; who, conſidering it as an infringement of the rights of parliament, proteſted againſt the whole proceedings of the day as being thereby null and void. Though Louis could not conceal his aſtoniſhment and diſpleaſure at this deciſive ſtep, he contented himſelf with repeating his orders; and immediately after quitting the aſſembly, retired to Verſailles. On the king's departure, the parliament confirmed the proteſt of the duke of Orleans; and declared, that as their deliberations had been interrupted, they conſidered the whole buſineſs of that day as of no effect.

It was not to be ſuppoſed that Louis would ſuffer ſo bold an attack upon his power with impunity. Accordingly a letter was next day delivered to the duke of Orleans, commanding him to retire to Villars Cotterel, one of his ſeats about 15 leagues from Paris, and to receive no company there except his own family; 194 Duke of Orleans and two members baniſhed. at the ſame time the Abbe Sabatiere and M. Freteau, both members of the parliament, and who had diſtinguiſhed themſelves in the debate, were ſeized under the authority of lettres de cachet, and conveyed, the firſt to the caſtle of Mont St Michael in Normandy, the laſt to a priſon in Picardy. This act of deſpotiſm did not fail immediately to rouſe the feelings of the parliament. 195 Strong remonſtrances of the parliament. On the following day they waited on the king, and expreſſed their aſtoniſhment and concern that a prince of the blood royal had been exiled, and two of their members impriſoned, for having declared in his preſence what their duty and conſciences dictated; and at a time when his majeſty had announced that he came to take the ſenſe of the aſſembly by a plurality of voices. The anſwer of the king was reſerved, forbidding, and unſatisfactory; and tended to increaſe the reſentment of the parliament. At the ſame time it did not prevent them from attending to the exigencies of the ſtate; and convinced of the emergency, they conſented to regiſter the loan for 450 millions of livres, which had been the ſource of this unfortunate difference. This conceſſion contributed to ſoften the mind of the king, and the ſentence of the two magiſtrates was in conſequence changed from impriſonment to exile; M. Freteau being ſent to one of his country ſeats, and the Abbe Sabatiere to a convent of Benedictines.

The parliament, however, was not to be ſoothed by that meaſure to give up the points againſt which they had originally remonſtrated. In a petition conceived with freedom, and couched in the moſt animated language, they boldly reprobated the late acts of arbitrary violence, and demanded the entire liberation of the perſons againſt whom they had been exerted. We have already noticed the fluctuating counſels of the court of

196
Duke of Orleans recalled.

Verſailles; and that Louis, as often as he was left to purſue his own inclinations, adopted meaſures of reconciliation. On the preſent occaſion, in the beginning of the year 1788, he recalled the duke of Orleans to court, who ſoon after obtained leave to retire to England; and he permitted the return of the Abbe de Sabatiere and M. Freteau to the capital.

197
New remonſtrances.

The parliament however had not confined their demands to the liberation of theſe gentlemen; but had alſo echoed the remonſtrances of the parliament of Grenoble, and had loudly inveighed againſt the execution of *lettres de cachet*. Theſe repeated remonſtrances, mingled with perſonal reflections, ſeconded moſt probably the ſuggeſtions of the queen, and Louis was once more inſtigated to meaſures of ſeverity. Meſſ. d'Eſpremevil and Monſambert, whoſe bold and pointed harangues had preſſed moſt cloſely on the royal dignity, were doomed to experience its immediate reſentment. While a body of armed troops ſurrounded the hotel in which the parliament were convened, Colonel Degout entered the aſſembly, and ſecured the perſons of the obnoxious members, who were inſtantly conducted to different priſons. This new inſtance of arbitrary violence occaſioned a remonſtrance from parliament, which in boldneſs far exceeded all the former repreſentations of that aſſembly. They declared they were now more ſtrongly confirmed, by every proceeding, of the entire innovation which was aimed at in the conſtitution. "But, ſire," added they, "the French nation will never adopt the deſpotic meaſures to which you are adviſed, and whoſe effects alarm the moſt faithful of your magiſtrates: we ſhall not repeat the unfortunate circumſtances which afflict us; we ſhall only repreſent to you with reſpectful firmneſs, that the fundamental laws of the kingdom *muſt* not be trampled upon, and that *your authority can only be eſteemed ſo long as it is tempered with juſtice.*"

198
Aſſembly of the Notables.

Language ſo pointed and deciſive, and which aſſerted the controlling power of the laws above the regal authority, could not fail of ſeriouſly alarming the king; and with a view to diminiſh the influence of parliament, it was determined again to convene the Notables. Accordingly, about the beginning of May, Louis appeared in that aſſembly; and after complaining of the exceſſes in which the parliament of Paris had indulged themſelves, and which had drawn down his reluctant indignation on a few of the members, he declared his reſolution, inſtead of annihilating them as a body, to recal them to their duty and obedience by a ſalutary reform. M. de la Moignon, as keeper of the ſeals, then explained his majeſty's pleaſure to eſtabliſh a *cour pleniere* or ſupreme aſſembly, to be compoſed of princes of the blood, peers of the realm, great officers of the crown, the clergy, mareſchals of France, governors of provinces, knights of different orders, a deputation of one member from every parliament, and two members from the chambers of council, and to be ſummoned as often as the public emergency, in the royal opinion, ſhould render it requiſite.

199
Oppoſition to the king's propoſals.

If the aſſembly of the Notables liſtened in ſilent deference to the project of their ſovereign, the parliament of Paris received it with every ſymptom of averſion. That body ſtrongly proteſted againſt the eſtabliſhment of any other tribunal; and declared their final reſolution not to aſſiſt at any deliberations in the ſupreme aſſembly which his majeſty prepared to inſtitute. A more unexpected mortification occurred to the king in the oppoſition of ſeveral peers of the realm: theſe expreſſed their regret at beholding the fundamental principles of the conſtitution violated; and while they were laviſh in their profeſſions of attachment to the perſon of their ſovereign, concluded with apologiſing for not entering on thoſe functions aſſigned them in the plenary court, as being inconſiſtent with the true intereſts of his majeſty, which were inſeparable from thoſe of the nation.

The flame quickly ſpread throughout the more diſtant provinces; at Rennes in Brittany, and Grenoble in Dauphinè, the people broke out into acts of the moſt daring outrage. In the latter city ſeveral hundreds of the inhabitants periſhed in a conflict with the military; they yet maintained their ground againſt the regulars; and the commanding officer, at the intreaties of the firſt preſident, readily withdrew his troops from a conteſt into which he had entered with reluctance. The different parliaments of the kingdom at the ſame time expreſſed their feelings in the moſt glowing language; and ſtrongly urged the neceſſity of calling together the ſtates-general, the lawful council of the kingdom, as the only means of reſtoring the public tranquillity.

Louis now plainly ſaw, that a compliance with the public wiſhes for the re-eſtabliſhment of the States-general was abſolutely neceſſary, in order to avoid the calamities of a civil war which impended upon his refuſal. In that event he muſt have expected to have encountered the majority of the people, animated by the exhortations and example of their magiſtrates: the peers of the realm had expreſſed the ſtrongeſt diſapprobation of his meaſures; nor could he even depend any longer on the ſupport of the princes of the blood: but what afforded moſt ſerious matter of alarm was the ſpirit lately diſplayed among the military, who, during the diſturbances of the provinces, had reluctantly been brought to draw their ſwords againſt their countrymen; and many of whoſe officers, ſo recently engaged in eſtabliſhing the freedom of America, publicly declared their abhorrence of deſpotiſm.

It was not, however, till after many a painful ſtruggle that Louis could reſolve to reſtore an aſſembly, whoſe influence muſt naturally overſhadow that of the crown, and whoſe juriſdiction would confine within narrow limits the boundleſs power he had inherited from his predeceſſor. In the two preceding reigns, the ſtates-general had been wholly diſcontinued; and though the queen-regent, during the troubles that attended the minority of Louis XIV. frequently expreſſed her intention of calling them together, ſhe was conſtantly diſſuaded by the repreſentations of Mazarin. It is probable, that the preſent monarch ſtill flattered himſelf with the hopes of being able to allure the members of that aſſembly to the ſide of the court; and having employed them to eſtabliſh ſome degree of regularity in the finances, and to curb the ſpirit of the parliaments, that he would again have diſmiſſed them to obſcurity.

200
Arret for ſummoning the ſtates-general.

Under theſe impreſſions an arret was iſſued in Auguſt, fixing the meeting of the ſtates-general to the firſt of May in the enſuing year; and every ſtep was taken to ſecure the favourable opinion of the public during the interval. New arrangements took place in the adminiſtration ; and M. Necker, whom the confidence of the people had long followed, was again introduced into the management of the finances ; the torture, which by a former edict had been reſtricted in part, was now entirely aboliſhed ; every perſon accuſed was allowed the aſſiſtance of counſel, and permitted to avail himſelf of any point of law ; and it was decreed, that in future ſentence of death ſhould not be paſſed on any perſon, unleſs the party accuſed ſhould be pronounced guilty by a majority at leaſt of three judges.

The time appointed for the convention of the ſtates-general was now approaching ; and the means of aſſembling them formed a matter of difficult deliberation in the cabinet. The laſt meeting, in 1614, had been convened by application to the bailiwicks. But this mode was liable to ſeveral ſtrong objections ; the bailiwicks had been increaſed in number and juriſdiction, ſeveral provinces having ſince that period been united to France ; and the numbers and quality of the members were no leſs an object of ſerious attention : it was not till the cloſe of the year, therefore, that the propoſal of M. Necker was adopted, which fixed the number of deputies at 1000 and upwards, and ordained that the repreſentatives of the third eſtate or commons ſhould equal in number thoſe of the nobility and clergy united.

The eyes of all Europe were now turned on the ſtates-general ; but the moment of that aſſembly's meeting was far from auſpicious : The minds of the French had long been agitated by various rumours ; the unanimity that had been expected from the different orders of the ſtates was extinguiſhed by the jarring pretenſions of each ; and their mutual jealouſies were attributed by the ſuſpicions of the people to the intrigues of the court, who were ſuppoſed already to repent of the haſty aſſent which had been extorted. A dearth that pervaded the kingdom increaſed the general diſcontent ; and the people, preſſed by hunger, and inflamed by reſentment, were ripe for revolt. The ſovereign alſo, equally impatient of the obſtacles he continually encountered, could not conceal his chagrin ; while the influence of the queen in the cabinet was again eſtabliſhed, and was attended by the immediate removal of M. Necker. The diſmiſſion of that miniſter, ſo long the favourite of the public, was the ſignal of open inſurrection, the Pariſians aſſembled in myriads ; the guards refuſed to oppoſe and ſtain their arms with the blood of their fellow-citizens; the count d'Artois and the moſt obnoxious of the nobility, thought themſelves happy in eluding by flight the fury of the inſurgents ; and in a moment a revolution was accompliſhed, the moſt remarkable perhaps of any recorded in hiſtory.

201
Inſurrections and revolution.

But that we may not take up room with an imperfect or dubious narration, we muſt defer giving any detail of particulars till ſome future opportunity, when the tide of innovation and reform now prevailing in that kingdom ſhall have ſubſided, and the government in one ſhape or another have attained a footing that promiſes to be durable. The objects of the revolution are many and arduous ; and it is impoſſible to ſay, whether we may have yet to record their entire conſummation ; or to recount a new train of events tending to ſhake the *republican* fabric, and to reſtore the influence and the ſplendor of *royalty*, though the ſceptre of *deſpotiſm* ſhould be ſwayed no more. In ſhort, it is wiſhed to have an opportunity, not only of detailing the progreſs, but of ſurveying the final iſſue, of the event in queſtion. Such an opportunity may perhaps be afforded by the time we arrive at the article REVOLUTION, where there will be occaſion to advert to the principal events which under that denomination have formed eras in the hiſtory of different nations, and when of courſe this great æra in the annals of France will claim a ſhare of attention proportioned to its magnitude and importance.

The air in France is pure, healthy, and temperate. The kingdom is ſo happily ſeated in the middle of the temperate zone, that ſome make it equal to Italy, with regard to the delightfulneſs of the landſcapes, and the fertility of the ſoil : however, it is certainly much more heathful. The ſoil produces corn, wine, oil, and flax, in great abundance ; and they have very large manufactures of linen, woollen, ſilk, and lace. They have a foreign trade to Spain, Italy, Turkey, and to the Eaſt and Weſt Indies. They themſelves reckon that the number of the inhabitants is 20,000,000. The kingdom is watered by a great number of rivers ; of which the four principal are, the Loire, the Seine, the Rhone, and the Garonne or Gironde. The monarchy was abſolute before the late revolution ; and the ſubjects were extremely devoted to their prince even under the greateſt acts of oppreſſion. The parliaments, for a long ſeries of years paſt, had little or no ſhare in the government ; and their buſineſs was confined to the paſſing and regiſtering the arrets or laws which the king was pleaſed to ſend them : however, they did not always pay a blind obedience to the king, and we have had frequent inſtances of their making a noble ſtand. In civil cauſes theſe parliaments were the laſt reſort, provided the court did not interpoſe. That of Paris was the moſt conſiderable, where the king uſed often to come in perſon to ſee his royal acts recorded. It conſiſted of the dukes and peers of France (when dukes and peers exiſted), beſides the ordinary members, who purchaſed their places ; and they only took cognizance of cauſes belonging to the crown. The revenues of the crown aroſe from the taille or land-tax, and the aids which proceed from the cuſtoms and duties on all merchandize, except ſalt, the tax upon which commodity is called the *gabelles** : beſides theſe, there were other taxes ; as, the capitation or poll-tax ; the tenths of all eſtates, offices, and employments; beſides the 15th penny, from which neither the nobility nor clergy were exempted. Add to theſe, the tenths and free-gifts of the clergy, who were allowed to tax themſelves ; and, laſtly, crown-rents, fines, and forfeitures, which brought in a conſiderable ſum. All theſe are ſaid to have amounted to 15,000,000 Sterling a-year. But the king had other reſources and ways of raiſing money, whenever neceſſity obliged him. The army, in time of peace, is ſaid to conſiſt of 200,000 men, and in time of war of 400,000 ; among whom are many Swiſs, Germans, Scots, Iriſh, Swedes, and Danes. There was till lately no religion allowed in France but the Roman Catholic, ever ſince the revocation of the edict of Nantz in 1685 ; though they are not ſo devoted to the pope as other nations of that communion,

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* Now aboliſhed. See *Gabel.*

nor had they ever any inquiſition among them. The Roman Catholic is ſtill the eſtabliſhed religion; but with ample toleration to the Proteſtants, who are now even not excluded from places of the higheſt truſt in the ſtate.

Iſle of FRANCE, a province of France, ſo called, becauſe it was formerly bounded by the river Seine, Marne, Oiſe, Aiſne, and Ourque. It comprehends, beſides Paris, the Beauvoſis, the Valois, the county of Senlis, the Vexin, the Hurepois, the Gatinois, the Multien, the Goele, and the Mentois. Paris is the capital.

FRANCESCA (Peter), an eminent Florentine painter of night-pieces and battles, was employed to paint the Vatican. He alſo painted portraits, and wrote on arithmetic and geometry. He died in 1458.

FRANCFORT *on the MAIN*, an Imperial and Hanſeatic town of Franconia in Germany, where the emperors were formerly elected. It is a handſome, ſtrong, and rich place, and has a great deal of commerce. Here the golden bull is preſerved, which is the original of the fundamental laws of the empire. It is ſeated in a fine fertile plain; and well fortified with a double ditch, baſtions, redoubts, and ravelins. The ſtreets are remarkably wide, and the houſes handſomely built. It has great conveniency for carrying on an extenſive trade with the other parts of Germany, by means of the navigable river which runs throughout it. The ſuburbs is called *Saxon hauſen*, and joined to the town by a ſtone bridge built over the Main. E. Long. 8. 40, N. Lat 49. 55.

FRANCFORT, on the Oder, a rich and handſome town of Germany, in the middle Marche of Brandenburg, formerly imperial, but now ſubject to the king of Pruſſia. E. Long. 15. 0. N. 52. 20.

FRANCHE-COMPTE, a province of France, bounded on the ſouth and weſt by Champagne and Burgundy; on the north by Lorrain; and to the eaſt by the earldom of Mumplegard, and Switzerland. It is in length from north to ſouth about 30 leagues; in breadth about 20. It is partly flat and partly hilly. The flat country is fruitful in grain, wine, hemp, and paſture; and the hilly country abounds in cattle, producing alſo ſome wine and corn, copper, lead, iron, and ſilver ores, mineral waters, and quarries of ſtone, marble, and alabaſter.

FRANCHISE, in law. *Franchiſe* and *liberty* are uſed as ſynonymous terms; and their definition is, "a royal privilege or branch of the king's prerogative, ſubſiſting in the hands of a ſubject." Being therefore derived from the crown, they muſt ariſe from the king's grant; or, in ſome caſes, may be held by preſcription, which, as had been frequently ſaid, preſuppoſes a grant. The kinds of them are various, and almoſt infinite. We ſhall here briefly touch upon ſome of the principal; premiſing only, that they may be veſted in either natural perſons or bodies-politic; in one man, or in many; but the ſame identical franchiſe, that has before been granted to one, cannot be beſtowed on another, for that would prejudice the former grant.

To be a county-palatine, is a franchiſe veſted in a number of perſons. It is likewiſe a franchiſe for a number of perſons to be incorporated and ſubſiſt as a body-politic; with a power to maintain perpetual ſucceſſion, and do other corporate acts: and each individual member of ſuch corporation is alſo ſaid to have a franchiſe or freedom. Other franchiſes are, to hold a court-leet: to have a manor or lordſhip; or, at leaſt, to have a lordſhip paramount: to have waifs, wrecks, eſtrays, treaſure-trove, royal fiſh, forfeitures, and deodands: to have a court of one's own, or liberty, of holding pleas and trying cauſes: to have the cognizance of pleas; which is a ſtill greater liberty, being an excluſive right, ſo that no other court ſhall try cauſes ariſing within that juriſdiction: to have a bailiwick, or liberty exempt from the ſheriff of the county; wherein the grantee only, and his officers, are to execute all proceſs: to have a fair or market; with the right of taking toll, either there or at any other public places, as at bridges, wharfs, or the like; which tolls muſt have a reaſonable cauſe of commencement (as in conſideration of repairs, or the like), elſe the franchiſe is illegal and void: or laſtly, to have a foreſt, chaſe, park, warren, or fiſhery, endowed with privileges of royalty. See CHASE, FOREST, &c.

FRANCHISE is alſo uſed for an aſylum or ſanctuary, where people are ſecure of their perſons, &c. Churches and monaſteries in Spain are franchiſes for criminals; ſo were they anciently in England, till they were abuſed to ſuch a degree that there was a neceſſity for aboliſhing the cuſtom. One of the moſt remarkable capitulars made by Charlemagne in his palace of Heriſtal in 779, was that relating to the franchiſes of churches. The right of franchiſe was held ſo ſacred, that even the leſs religious kings obſerved it to a degree of ſcrupulouſneſs; but to ſuch exceſs in time was it carried, that Charlemagne reſolved to reduce it. Accordingly he forebad any proviſion being carried to criminals retired into churches for refuge.

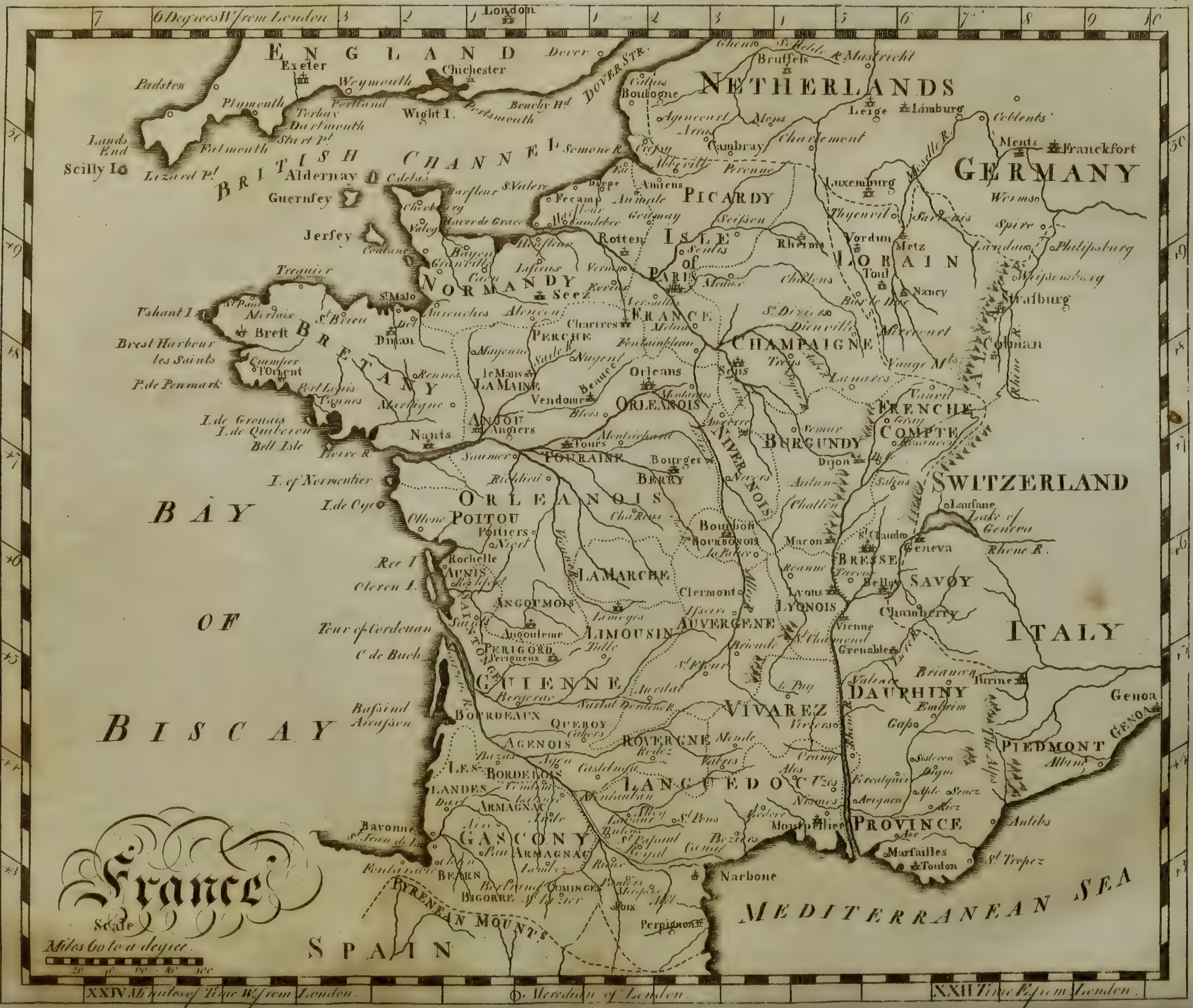
FRANCHISE of Quarters, is a certain ſpace or diſtrict at Rome, wherein are the houſes of the ambaſſadors of the princes of Europe; and where ſuch as retire cannot be arreſted or ſeized by the ſbirri or ſerjeants, nor perſecuted at law. The people of Rome look on this as an old uſurpation and a ſcandalous privilege, which ambaſſadors, out of a jealouſy of their power, carried to a great length in the 15th century, by enlarging inſenſibly the dependencies of their palaces or houſes, within which the right of franchiſe was anciently confined. Several of the popes, Julius III. Pius XIV. Gregory XIII. and Sixtus V. publiſhed bulls and ordinances againſt this abuſe; which had reſcued ſo conſiderable a part of the city from their authority, and rendered it a retreat for the moſt abandoned perſons. At length Innocent XI. expreſsly refuſed to receive any more ambaſſadors but ſuch as would make a formal renounciation of the franchiſe of quarters.

FRANCIA (Franceſco), a celebrated Bologneſe painter, born in 1350. He was firſt a goldſmith or jeweller, afterwards a graver of coins and medals; but applying at laſt to painting, obtained great reputation by his works, particularly by a piece of St Sebaſtian, whom he had drawn bound to a tree with his hands tied over his head. He pined himſelf into a conſumption, by deſpairing to equal Raphael; and died in 1518.

FRANCIS I. king of France, the rival of the emperor Charles V. and the reſtorer of learning and politeneſs in France. See (*Hiſtory* of) FRANCE.

FRANCIS (Philip), a very ingenious writer, of Iriſh ex-

Plate CCII.


France
Scale
Miles 60 to a degree
20 40 60 80 100
6 Degrees W. from London
London
XXIV Minutes of Time W. from London
Meridian of London
XXII Time E. from London
ENGLAND
Exeter
Chichester
Dover
Padstow
Plymouth
Weymouth
Portland
Torbay
Dartmouth
Start Pt.
Falmouth
Lizard Pt.
Lands End
Scilly Is.
Wight I.
Portsmouth
Beachy Hd.
DOVER STR.
BRITISH CHANNEL
Alderney
Guernsey
Jersey
NETHERLANDS
Bruffels
Mastricht
Ghent
Calais
Boulogne
Agincourt
Arras
Mons
Cambray
Charlemont
Leige
Limburg
Coblentz
Ments
Franckfort
GERMANY
Worms
Spire
Landau
Philipsburg
Strasburg
Colmar
Rhine
PICARDY
Amiens
Abbeville
Peronne
Soissons
Dieppe
Fecamp
Aumale
Havre de Grace
Harfleur
Barfleur
S. Valery
Cherbourg
Valogne
Coutance
Bayeux
Granville
Caen
Lisieux
NORMANDY
Seez
Rotten
ISLE of PARIS
Senlis
Meaux
Paris
Versailles
FRANCE
Melun
Fontainbleau
Chartres
Alençon
PERCHE
Nogent
Mayenne
St. Malo
Dinan
Dol
Avranches
Treguier
Ushant I.
St. Paul
Morlaix
St. Brieu
Brest
Brest Harbour
les Saints
Quimper
l'Orient
P. de Penmark
Port Louis
Vannes
BRETANY
Rennes
Nants
I. de Grouais
I. de Quiberon
Bell Isle
Loire R.
I. of Normoutier
I. de Oye
le Mans
LA MAINE
Vendome
Blois
Orleans
ORLEANOIS
ANJOU
Angers
Saumur
Tours
TOURAINE
Richlieu
Bourges
BERRY
ORLEANOIS
POITOU
Poitiers
Niort
Olone
Rochelle
AUNIS
Ree I.
Oleron I.
Tour of Cordouan
C. de Buch
Bassin d'Arcasson
ANGOUMOIS
Angouleme
SAINTONGE
Saintes
PERIGORD
Perigueux
LA MARCHE
Limoges
LIMOUSIN
Tulle
GUIENNE
Bergerac
BORDEAUX
QUERCY
Cahors
AGENOIS
Agen
Bazas
LES BORDELOIS
LANDES
Dax
ARMAGNAC
Bayonne
St. Jean de Luz
Fontarabie
BEARN
Pau
BIGORRE
GASCONY
COMINGES
Foix
Perpignan
Narbone
PYRENEAN MOUNTS
SPAIN
BAY OF BISCAY
MEDITERRANEAN SEA
CHAMPAIGNE
Rheims
Chalons
Troyes
Sens
Langres
St. Dizier
LORAIN
Luxemburg
Thyonvil
Metz
Verdun
Toul
Nancy
Vauge Mts.
FRENCHE COMPTE
Besançon
Dole
Salins
Dijon
BURGUNDY
Auxerre
Semur
Autun
Chalon
NIVERNOIS
Nevers
Bourbon
BOURBONOIS
Moulins
Macon
BRESSE
St. Claude
Belley
Geneva
Lausane
Lake of Geneva
Rhone R.
SWITZERLAND
SAVOY
Chamberry
ITALY
Clermont
AUVERGNE
Issoire
St. Flour
Aurillac
LYONOIS
Lyons
Roanne
Vienne
St. Chamond
Grenoble
Le Puy
VIVAREZ
Viviers
ROVERGNE
Rodez
Mende
LANGUEDOC
Montauban
Castelnau
Alby
St. Pons
Toulouse
Beziers
Canal Royal
Montpellier
Nismes
Alais
Uzez
Orange
DAUPHINY
Valence
Briançon
Embrun
Gap
Turine
PIEDMONT
The Alps
Genoa
PROVINCE
Avignon
Aix
Sisteron
Digne
Riez
Forcalquier
Marseilles
Toulon
Antibes
St. Tropez

extraction, if not born in that kingdom. His father was a dignified clergyman in Ireland, being dean of ſome cathedral; and our author, his ſon, was alſo bred to the church, and had a doctor's degree conferred on him. He was more diſtinguiſhed as a tranſlator than as an original writer. His verſions of Horace and Demoſthenes have been juſtly valued: the former is accompanied with notes, and is perhaps as complete and uſeful a work of its kind as hath yet appeared. He was alſo a conſiderable political writer; and in the beginning of the preſent reign is ſuppoſed to have been employed by the government: for which ſervice, he was promoted to the rectory of Barrow in Suffolk, and to the chaplainſhip of Chelſea hoſpital. He was alſo the author of two tragedies, Eugenia, and Conſtantia; but, as a dramatic writer, not very ſucceſsful. He died at Bath in March 1773; leaving a ſon, who was then one of the ſupreme council at Bengal.

FRANCISCANS, in eccleſiaſtical hiſtory, are religious of the order of St Francis, founded by him in the year 1209. Francis was the ſon of a merchant of Aſſiſi, in the province of Umbria, who, having led a diſſolute life, was reclaimed by a fit of ſickneſs, and afterwards fell into an extravagant kind of devotion, that looked leſs like religion than alienation of mind. Soon after this, viz. in the year 1208, hearing the paſſage repeated, Matt. x. 9. 10. in which Chriſt addreſſes his apoſtles, *Provide neither gold, nor ſilver,* &c. he was led to conſider a voluntary and abſolute poverty as the eſſence of the goſpel, and to preſcribe this poverty as a ſacred rule both to himſelf and to the few that followed him. This new ſociety, which appeared to Innocent III. extremely adapted to the preſent ſtate of the church, and proper to reſtore its declining credit, was ſolemnly approved and confirmed by Honorius III. in 1223, and had made a conſiderable progreſs before the death of its founder in 1226. Francis, through an exceſſive humility, would not ſuffer the monks of his order to be called *fratres,* i. e. brethren or friars, but *fraterculi,* i. e. little brethren, or friars-minor, by which denomination they ſtill continue to be diſtinguiſhed. They are alſo called *grey friars,* on account of the colour of their clothing, and *cordeliers,* &c. The Franciſcans and Dominicans were zealous and active friends to the papal hierarchy, and, in return, were diſtinguiſhed by peculiar privileges and honourable employments. The Franciſcans, in particular, were inveſted with the treaſure of ample and extenſive indulgences; the diſtribution of which was committed to them by the popes, as a means of ſubſiſtence, and a rich indemnification for their voluntary poverty. In conſequence of this grant, the rule of the founder, which abſolutely prohibited both perſonal and collective property, for that neither the individual nor the community were to poſſeſs either fund, revenue, or any worldly goods, was conſidered as too ſtrict and ſevere, and diſpenſed with ſoon after his death. In 1231, Gregory IX. publiſhed an interpretation of this rule, mitigating its rigour; which was farther confirmed by Innocent IV. in 1245, and by Alexander IV. in 1247. Theſe milder alterations were zealouſly oppoſed by a branch of the Franciſcans called the *ſpiritual;* and their complaints were regarded by Nicholas III. who, in 1279, publiſhed a famous conſtitution, confirming the rule of St Francis, and containing an elaborate explication of the maxims it recommended, and the duties it preſcribed. In 1287, Matthew of Aqua Sparta, being elected general of the order, diſcouraged the ancient diſcipline of the Franciſcans, and indulged his monks in abandoning even the appearance of poverty; and this conduct inflamed the indignation of the ſpiritual or auſterer Franciſcans; ſo that from the year 1290, ſeditions and ſchiſms aroſe in an order that had been ſo famous for its pretended diſintereſtedneſs and humility. Such was the enthuſiaſtic phrenzy of the Franciſcans, that they impiouſly maintained, that the founder of their order was a ſecond Chriſt, in all reſpects ſimilar to the firſt; and that their inſtitution and diſcipline were the true goſpel of Jeſus. Accordingly, Albizi, a Franciſcan of Piſa, publiſhed a book in 1383, with the applauſe of his order, intitled, The Book of the Conformities of St Francis with Jeſus Chriſt. In the beginning of this century, the whole Franciſcan order was divided into two parties; the one, embracing the ſevere diſcipline and abſolute poverty of St Francis, were called *ſpirituals;* and the other, who inſiſted on mitigating the auſtere injunctions of their founder, were denominated *brethren of the community.* Theſe wore long, looſe, and good habits, with large hoods; the former were clad in a ſtrait, coarſe, and ſhort dreſs, pretending that this dreſs was enjoined by St Francis, and that no power on earth had a right to alter it. Neither the moderation of Clement V. nor the violence of John XXII. could appeaſe the tumult occaſioned by theſe two parties: however, their rage ſubſided from the year 1329. In 1368 theſe two parties were formed into two large bodies, comprehending the whole Franciſcan order, which ſubſiſt to this day; viz. the *conventual brethren,* and the *brethren of the obſervance* or *obſervation,* from whom ſprung the capuchins and recollects. The general opinion is, that the Franciſcans came into England in the year 1224, and had their firſt houſe at Canterbury, and their ſecond at London; but there is no certain account of their being there till king Henry VII. built two or three houſes for them at the diſſolution of the monaſteries, the conventual Franciſcans had about 55 houſes, which were under ſeven cuſtodies or wardenſhips; viz. thoſe of London, York, Cambridge, Briſtol, Oxford, Newcaſtle, and Worceſter.

FRANCONIA, a circle of the German empire, lying between Bohemia on the eaſt, and the electorate of Mentz on the weſt. Its capital is Nuremburg; and from this country the Franks, who conquered and gave name to the kingdom of France, are ſaid to have come.

FRANGULA, in botany. See Rhamnus.

FRANK language, *Lingua Franca,* a kind of jargon ſpoken on the Mediterranean, and particularly throughout the coaſts and ports of the Levant, compoſed of Italian, Spaniſh, French, Vulgar Greek, and other languages.

Frank, or *Franc,* an ancient coin, either of gold or ſilver, ſtruck and current in France. The value of the gold Frank was ſomething more than that of the gold crown; the ſilver Frank was a third of the gold one: this coin has been long out of uſe, tho' the term is ſtill retained as the name of a money of account; in which ſenſe it is equivalent to the livre, or 20 ſols.

FRANK, or *Franc*, meaning literally *free* from charges and impoſitions, or exempt from public taxes, has various ſignifications in the ancient Engliſh cuſtoms.

FRANK Almoigne, (libera eleemoſyna), or "free alms;" a tenure of a ſpiritual nature, whereby a religious corporation, aggregate or ſole, holdeth lands of the donor to them and their ſucceſſors for ever. The ſervice which they were bound to render for theſe lands was not certainly defined: but only in general to pray for the ſouls of the donor and his heirs, dead or alive; and therefore they did no fealty (which is incident to all other ſervices but this), becauſe this divine ſervice was of an higher and more exalted nature. This is the tenure by which almoſt all the ancient monaſteries and religious houſes held their lands; and by which the parochial clergy, and very many eccleſiaſtical and eleemoſynary foundations, hold them at this day; the nature of the ſervice being upon the reformation altered and made conformable to the purer doctrines of the church of England. It was an old Saxon tenure; and continued under the Norman revolution, through the great reſpect that was ſhown to religion and religious men in ancient times. This is alſo the reaſon that tenants in frankalmoign were diſcharged of all other ſervices except the *trinoda neceſſitas*, of repairing the highways, building caſtles, and repelling invaſions; juſt as the druids, among the ancient Britons, had *omnium rerum immunitatem*. And even at preſent this is a tenure of a very different nature from all others; being not in the leaſt feodal, but merely ſpiritual. For, if the ſervice be neglected, the law gives no remedy by diſtreſs, or otherwiſe, to the lord of whom the lands are holden; but merely a complaint to the ordinary or viſitor to correct it.

FRANK-Chaſe is defined to be a liberty of free chace, whereby perſons that have lands within the compaſs of the ſame, are prohibited to cut down any wood, &c. out of the view of the foreſter.

FRANK-Fee, ſignifies the ſame thing as holding lands and tenements in fee-ſimple; that is, to any perſon and his heirs, and not by ſuch a ſervice as is required by ancient demeſne, but is pleaded at common law. See FEE.

FRANK-Law, a word applied to the free and common law of the land, or the benefit a perſon has by it.

He that for any offence loſeth this frank-law, incurs theſe inconveniences, viz. He may not be permitted to ſerve on juries, nor uſed as an evidence to the truth; and if he has any thing to do in the king's court, he muſt not approach it in perſon, but appoint his attorney; his lands, goods, and chattels, ſhall be ſeized into the king's hands; and his lands be eſtreated, his trees rooted up, and his body committed to cuſtody.

FRANK-Marriage, in law, is where tenements are given by one man to another, together with a wife, who is the daughter or couſin to the donor, to hold in frank-marriage. By ſuch gift, though nothing but the word *frank-marriage* is expreſſed, the donees ſhall have the tenements to them, and the heirs of their two bodies begotten; that this, they are tenants in ſpecial tail. For this one word, *frank-marriage*, denotes, *ex vi termini*, not only an inheritance, like the word *frank-almoigne*, but likewiſe limits that inheritance; ſupplying not only words of deſcent, but of procreation alſo. Such donees in frank-marriage are liable to no ſervice but fealty; for a rent reſerved therein is void until the fourth degree of conſanguinity be paſt between the iſſues of the donor and donee.

FRANK-Pledge, in law, ſignifies a pledge or ſurety for the behaviour of freemen.

According to the ancient cuſtom of England, for the preſervation of the public peace, every free-born man, at the age of fourteen, except religious perſons, clerks, knights, and their eldeſt ſons, was obliged to give ſecurity for his truth and behaviour towards the king and his ſubjects, or elſe be impriſoned. Accordingly, a certain number of neighbours became interchangeably bound for each other, to ſee each perſon of their pledge forth coming at all times, or to anſwer for the offence of any one gone away; ſo that whenever any perſon offended, it was preſently inquired in what pledge he was, and there the perſons bound either produced the offender in 31 days, or made ſatisfaction for his offence.

FRANK-Tenement. See TENURE.

FRANKED LETTERS. The privilege of letters coming free of poſtage to and from members of parliament was claimed by the Engliſh houſe of commons in 1660, when the firſt legal ſettlement of the preſent poſt office was made; but afterwards dropped, upon a private aſſurance from the crown, that this privilege ſhould be allowed the members. And accordingly a warrant was conſtantly iſſued to the poſt maſter-general, directing the allowance thereof to the extent of two ounces in weight: till at length it was expreſly confirmed by 4 Geo. III. *c.* 14. which adds many new regulations, rendered neceſſary by the great abuſes crept into the practice of franking; whereby the annual amount of franked letters had increaſed from L. 23,600 in the year 1715, to L. 170,700 in the year 1763. Further regulations have ſince taken place; in particular, franks muſt be dated (the month written at length), and put into the office the ſame day; notwithſtanding which, the revenue ſtill loſes by this privilege above L.80,000 *per annum*.

FRANKEN (Franciſcus), commonly called *Old Frank*, a famous Flemiſh painter, ſuppoſed to have been born about the year 1544; but though his works are well known, very few of the circumſtances of his life have been tranſmitted to poſterity. This maſter painted hiſtorical ſubjects from the Old and New Teſtaments; and was remarkable for introducing a great number of figures into his compoſitions, which he had the addreſs to group very diſtinctly. Vandyck often commended his works, and thought them worthy of a place in any collection.

FRANKEN (Franciſcus), diſtinguiſhed by the name of *Young Frank*, was the ſon of the former, born in the year 1580. He was inſtructed by his father; whoſe ſtyle he adopted ſo cloſely, that their works are frequently miſtaken. When he found himſelf ſufficiently ſkilled at home, he travelled into Italy for improvement in colouring; and, on his return, his works were much coveted. The moſt capital performance of this painter are, a ſcriptural performance in the church of Notre-dame at Antwerp; and an excellent picture, in a ſmall ſize, of Solomon's idolatry. Young Frank died in 1642.

FRANKENDAL, a ſtrong town of Germany, in the dominions of the Elector Palatine. It was taken by the Spaniards in 1623, by the Swedes in 1632, and burnt by the French in 1688. E. Long. 8. 29. N. Lat. 49. 28.

FRANKENIA, in botany: A genus of the monogynia order, belonging to the hexandria claſs of plants; and in the natural method ranking under the 17th order, *Calycanthemæ*. The calyx is quinquefid, and funnel-ſhaped; the petals five; the ſtigma ſexpartite; the capſule unilocular and trivalvular.

FRANKINCENSE. See INCENSE.

FRANKLIN (Dr Benjamin). See APPENDIX.

FRANKLIN (Thomas), D. D. chaplain in ordinary to his Britannic majeſty, was the ſon of Richard Franklin, well known as the printer of an anti-miniſterial paper called *The Craftſman*; in the conducting of which he received great aſſiſtance from Lord Bolingbroke, Mr Pulteney, and other excellent writers, who then oppoſed Sir Robert Walpole's meaſures. By the advice of the ſecond of theſe gentlemen, young Franklin was devoted to the church, with a promiſe of being provided for by the patriot; who afterwards forgot his undertaking, and then entirely neglected him. He was educated at Weſtminſter-ſchool; from whence he went to the univerſity of Cambridge, where he became fellow of Trinity College, and was ſome time Greek profeſſor. In Dec. 1758, he was inſtituted vicar of Ware and Thundridge; which, with the lectureſhip of St Paul, Covent-Garden, and a chapel in Queen-ſtreet, were all the preferments he held till he obtained the rectory of Braſted in Kent. This gentleman was poſſeſſed of no inconſiderable ſhare of learning and poetical abilities, and was long a favourite in the literary world. His tranſlations of Phalaris, Sophocles, and Lucian, equally evince his learning and his genius, as they are not more diſtinguiſhed for fidelity in the verſion, than congeniality with the ſpirit of the admirable originals. Dr Franklin, like Mr Foote, ſuffered a tranſlation from the French to be printed in his name; but the Oreſtes and Electra are ſuppoſed to be all that were really by him. It was a tranſlation of Voltaire's works, to which alſo Dr Smollet's name appears. His own dramatic compoſitions, of which the principal are the tragedies of The Earl of Warwick and Matilda, are univerſally known, and deſervedly eſteemed by the public; ſo that his death, which happened March 15, 1784, may be conſidered as a loſs to the republic of letters.

FRANKS, FRANCS, FRANKIS, or FRANQUIS, a name which the Turks, Arabs, Greeks, &c. give to all the people of the weſtern parts of Europe. The appellation is commonly ſuppoſed to have had its riſe in Aſia, at the time of the croiſades; when the French made the moſt conſiderable figure among the croiſſees: from which time the Turks, Saracens, Greeks, Abyſſinians, &c. uſed it as a common term for all the Chriſtians of Europe; and called Europe itſelf *Frankiſtan*. The Arabs and Mahometans, ſays M. d'Herbelot, apply the term *Franks* not only to the French (to whom the name originally belonged), but alſo to the Latins and Europeans in general.

But F. Goar, in his notes on Condinus, cap. 5. n. 43. furniſhes another origin of the appellation *Franks*, of greater antiquity than the former. He obſerves, that the Greeks at firſt confined the name to the *Franci*, *i. e.* the German nations, who had ſettled themſelves in France or Gaul; but afterwards they gave the ſame name to the Apulians and Calabrians, after they had been conquered by the Normans; and at length the name was farther extended to all the Latins.

In this ſenſe is the word uſed by ſeveral Greek writers; as Comnenus, &c. who, to diſtinguiſh the French, call them the *weſtern Franks*. Du-Cange adds, that about the time of Charlemagne, they diſtinguiſhed eaſtern France, weſtern France, Latin or Roman France, and German France, which was the ancient France, afterwards called *Franconia*.

FRASCATI, or FRESCATI. See FRESCATI.

FRASERSBURGH, a ſmall ſea-port town in the county of Aberdeen, ſituated in a cheap and populous country, on the point of land called *Kinnaird's Head*, which is the ſouthern extremity of the Murray firth. It has a ſmall good harbour, made and kept up at a conſiderable expence by the proprietor and the town, and well adapted for building of ſmall veſſels. According to the tide, there are 11 to 15 feet water within the harbour, and 20 feet immediately without at ſpring-tides: without is a tolerable road for ſhipping, in a bay nearly a league in length and half a league in depth, with good anchorage in a ſandy bottom. Veſſels of about 200 tons burden enter the harbour at preſent. Fraſerſburgh contains about 1000 inhabitants, and is well ſituated for trade with the eaſt coaſt of Europe. The town has lately advanced conſiderably, and requires only encouragement to render it a port of ſome conſequence on the coaſt of Scotland. At preſent it carries on a ſmall trade to the eaſt ſea, ſeveral manufactories are forming in its neighbourhood, and the port is well adapted for building of ſmall veſſels.

FRATERNAL, ſomething belonging to the relation of brother.

FRATERNAL *Affection* is the love and attachment ſubſiſting among, or due to one another by, children of the ſame family.

Though all mankind ſprung from the ſame head, and are bound to cultivate a mutual good-will to each other; yet this duty is not ſo obvious and ſtriking as that which is incumbent on thoſe who belong to the ſame family. Nothing can approach nearer to ſelf-love than fraternal affection: and there is but a ſhort remove from our own concerns and happineſs, to theirs who come from the ſame ſtock, and are partakers of the ſame blood. Nothing, therefore, can be more horrible than diſcord and animoſity among members ſo allied; and nothing ſo beautiful as harmony and love.

This relation is formed by nature, not by choice; and though it has many things in common with, yet it is prior to, the obligations of friendſhip: conſequently nature and reaſon dictate that there ſhould be a peculiar affection between brethren. We are not obliged, however, to make a brother or ſiſter an intimate or boſom friend in preference to one who is not akin. Diverſity of temper, and want of ſuitable qualifications, may render it unſafe and improper. But where friendſhip and fraternity meet in the ſame perſons, ſuch a conjunction adds a luſtre to the relation.

Among brethren, an hearty benevolence, an ardent concern for each other's welfare, a readineſs to ſerve and promote it, are the peculiar offices of this relation; and though friends are to have their ſhare, yet the claim of kindred is firſt and ordinarily ſtrongeſt. "Neceſſaria præſidia vitæ debentur iis maxime (ſays Cicero), quos ante dixi (*i. e.* propinquis); vita autem, victuſque communis, concilia, ſermones, &c. in amicitiis vigent maxime." *De Officiis.*

FRATERNITY, BROTHERHOOD, the relation or union of brothers, friends, partners, aſſociates, &c.

FRATERNITY, in a civil ſenſe, is uſed for a guild, aſſociation, or ſociety of perſons, united into a body, for ſome common intereſt or advantage. See COMPANY and GUILD.

FRATERNITY, in the Roman Catholic countries, ſignifies a ſociety for the improvement of devotion. Of theſe there are ſeveral ſorts: as, 1. The fraternity of the roſary, founded by St Dominic. It is divided into two branches, called the *common roſary*, and the *perpetual roſary*; the former of whom are obliged to confeſs and communicate every firſt Sunday in the month, and the latter to repeat the roſary continually. 2. The fraternity of the ſcapulary, whom the bleſſed Virgin, according to the ſabbatine bull of Pope John XXII. has promiſed to deliver out of hell the firſt Sunday after their death. 3. The fraternity of St Francis's girdle are clothed with a ſack of grey colour, which they tie with a cord; and in proceſſions walk barefooted, carrying in their hands a wooden croſs. 4. That of St Auſtin's leathern girdle, comprehends a great many devotees. Italy, Spain, and Portugal, are the countries where one ſees the greateſt number of theſe fraternities, ſome of which aſſume the name of *arch-fraternities*. Pope Clement VII. inſtituted the arch-fraternity of charity, which diſtributes bread every Sunday among the poor, and gives portions to 40 poor girls on the feaſt of St Jerom their patron. The fraternity of death, buries ſuch dead as are abandoned by their relations, and cauſes maſſes to be celebrated for them.

FRATRES ARVALES. See ARVALES.

FRATRIAGE, the partition among brothers, or coheirs, coming to the ſame inheritance or ſucceſſion.

FRATRICELLI, in eccleſiaſtical hiſtory, an enthuſiaſtic ſect of Franciſcans, which roſe in Italy, and particularly in the marquiſate of Ancona, about the year 1294. The word is an Italian diminutive, ſignifying *fraterculi*, or "little brothers;" and was here uſed as a term of deriſion, as they were moſt of them apoſtate monks, whom the Italians call *fratelli*, or *fratricelli*. For this reaſon the term *fratricelli*, as a nick-name, was given to many other ſects, as the Cathariſts, the Waldenſes, &c. however different in their opinions and in their conduct. But this denomination applied to the auſtere part of the Franciſcans was conſidered as honourable. See FRANCISCANS.

The founders were P. Maurato, and P. de Foſſombroni, who having obtained of pope Celeſtin V. a permiſſion to live in ſolitude, after the manner of hermits, and to obſerve the rule of St Francis in all its rigour, ſeveral idle vagabond monks joined them, who, living after their own fancies, and making all perfection to conſiſt in poverty, were ſoon condemned by pope Boniface VIII. and his ſucceſſor, and the inquiſitors ordered to proceed againſt them as heretics: which commiſſion they executed with their uſual barbarity. Upon this, retiring into Sicily, Peter John Oliva de Serignan had no ſooner publiſhed his Comment on the Apocalypſe, than they adopted his errors. They held the Romiſh church to be Babylon, and propoſed to eſtabliſh another far more perfect one. They were condemned afreſh by pope John XXII. In conſequence of whoſe cruelty they regarded him as the true antichriſt; but ſeveral of them returning into Germany, were ſheltered by Lewis, duke of Bavaria, the emperor.

There are authentic records, from which it appears, that no leſs than 2000 perſons were burnt by the inquiſition, from the year 1318 to the time of Innocent VI. for their inflexible attachment to the poverty of St Francis. The ſeverities againſt them were again revived towards the cloſe of the 15th century by pope Nicolas V. and his ſucceſſors. However, all the perſecutions which this ſect endured were not ſufficient to extinguiſh it; for it ſubſiſted until the times of the reformation in Germany, when its remaining votaries adopted the cauſe and embraced the doctrine and diſcipline of Luther. And this has led Popiſh writers to charge the Fratricelli with many enormities, ſome of which are recounted by M. Bayle, art. *Fratricelli*.

The Fratricelli had divers other denominations: they were called *fratricelli*, according to ſome, becauſe they lived in community, in imitation of the primitive Chriſtians, or rather through the humility of the founder of the Franciſcan order, to which the Fratricelli originally belonged; *dulcini*, from one of their doctors; *Bizochi*, *Beguins*, and *Beghardi*.

FRATRICIDE, the crime of murdering one's brother. See PARRICIDE.

FRAUD, in law, ſignifies deceit in grants, or conveyances of lands, &c. or in bargains and ſales of goods, &c. to the damage of another perſon.

A fraudulent conveyance of lands or goods to deceive creditors, as to creditors is void in law. And a fraudulent conveyance in order to defraud purchaſers, is alſo to ſuch purchaſers void; and the perſons juſtifying or putting off ſuch grants as good, ſhall forfeit a year's value of the lands, and the full value of the goods and chattels, and ſhall likewiſe be impriſoned. See CHEATING.

FRAUSTADT, a town of Sileſia, on the frontiers of Poland, remarkable for a battle gained by the Swedes over the Saxons in 1706. E. Long. 15. 50. N. Lat. 51. 45.

FRAXINELLA, in botany. See DICTAMNUS. —It is remarkable of this odorous plant, that, when in full bloſſom, the air which ſurrounds it in a ſtill night, may be inflamed by the approach of a lighted candle. Dr Watſon doubts whether this inflammability proceeds from an inflammable air which is exhaled by the plant, or from ſome of the finer parts of the eſſential oil of the plant being diſſolved in the common atmoſpherical air. The latter is the moſt probable ſuppoſition; for were it the pure inflammable air, as Mr Cavallo obſerves, it would, on account of its ſmall ſpecific gravity, leave the plant as ſoon as it was produced. Common air acquires the property of becoming inflammable, by being tranſmitted through ſeveral eſſential oils.

FRAXINUS, the ASH: A genus of the diœcia order, belonging to the polygamia claſs of plants; and in the natural method ranking under the 44th order, *Sepiariæ*. There is no hermaphrodite calyx, or it is quadripartite; and there is either no corolla, or it is tetrapetalous: there are two ſtamina; one piſtil; one lanceolated ſeed; and the piſtil of the female is lanceolated. There are ſix ſpecies; of which the moſt uſeful is the common aſh, which is ſo well known, that it needs no deſcription. If a wood of theſe trees is rightly managed, it will turn greatly to the advantage of the owner: for, by the underwood, which will be fit to cut every eight or ten years, there will be a continual income, more than ſufficient to pay the rent of the ground and all other charges; and ſtill there will be a ſtock preſerved for timber, which in a few years will be worth 40s. or 50s. per tree. This tree flouriſhes beſt in groves, but grows very well in rich ſoil in open fields. It bears tranſplanting and lopping. In the north of England they lop the tops of theſe trees to feed the cattle in autumn when the graſs is on the decline; the cattle peeling off the bark as food. The wood hath the ſingular property of being nearly as good when young as when old. It is hard and tough, and is much uſed to make the tools employed in huſbandry. The aſhes of the wood afford very good potaſh. The bark is uſed in tanning calfſkin. A ſlight infuſion of it appears of a pale yellowiſh colour when viewed betwixt the eye and the light; but when looked down upon, or placed betwixt the eye and an opake object, appears blue. This blueneſs is deſtroyed by the addition of an acid, but recovered by alkalies. The ſeeds are acrid and bitter. In the church-yard of Lochaber in Scotland, Dr Walker meaſured the trunk of a dead aſh tree, which at five feet from the ſurface of the ground was 58 feet in circumference.—Horſes, cows, ſheep, and goats eat it; but it ſpoils the milk of cows, ſo that it ſhould not be planted in dairy farms.

FRAY literally ſignifies to fret; as cloth or ſtuff does by rubbing, or over-much wearing.

Among hunters a deer is ſaid to fray his head, when he rubs it againſt a tree, to cauſe the ſkins of his new horns to come off.

FREA, or Frigga, the wife of Odin, was, next to him, the moſt revered divinity among the Heathen Saxons, Danes, and other northern nations. As Odin was believed to be the father, Frea was eſteemed the mother of all the other gods. In the moſt ancient times, Frea was the ſame with the goddeſs Herthus, or Earth, who was ſo devoutly worſhipped by the Angli and other German nations. But when Odin, the conqueror of the north, uſurped the honours due only to the true Odin, his wife Frea uſurped thoſe which had been formerly paid to mother Earth. She was worſhipped as the goddeſs of love and pleaſure, who beſtowed on her votaries a variety of delights, particularly happy marriages and eaſy child-births. To Frea the ſixth day of the week was conſecrated, which ſtill bears her name.

FREAM, a name given by farmers to ploughed land worn out of heart, and laid fallow till it recover.

FREATS, or Freits, a term uſed in Scotland for *ill omens*, and ſometimes denoting accidents ſupernaturally unlucky. King James VI. in his *Dæmonologie, MS. pen. Edit.* B. I. *ch.* IIII. *p.* 13. "But I pray you forget not likeways to tell what are the Devill's rudimentis? E. His rudimentis I call firſt in generall all that quhilk is called vulgairelie the virtu of woode, herbe, and ſtaine; quhilk is uſed by unlawful charmis without natural cauſis. As lykeways all kynd of prattiques, *freitis, or utherlyk extraordinair actions, quhilk cannot abyde the trew twiche of naturall raiſon.*" It occurs again in the ſame ſenſe in *p.* 14. *marg. note;* and in *p.* 41. ſpeaking of *Sorcerers:* "And in generall that naime was gevin thaime for uſing of ſic chairmis and *freitis*, as that craft teachis thaime."

FRECKLES, Lentigines, ſpots of a yellowiſh colour, of the bigneſs of a lentile-ſeed, ſcattered over the face, neck, and hands. Freckles are either natural, or proceeding accidentally from the jaundice or the action of the ſun upon the part. Heat, or a ſudden change of the weather, will often cauſe the ſkin to appear of a darker colour than natural; and thereby produce what is called *tan*, *ſunburn*, and *morphew*, which ſeem to differ only in degree; and uſually diſappear in winter.

Perſons of a fine complexion, and ſuch whoſe hair is red, are the moſt ſubject to freckles, eſpecially in thoſe parts which they expoſe to the air.

To remove freckles, put juice of lemons in a glaſs-vial, and, mixing it with ſugar and borax finely powdered, let it digeſt eight days, and then uſe it. Homberg propoſes bullock's gall mixed with alum, and, after the alum has precipitated, expoſed three or four months to the ſun in a cloſe vial, as one of the beſt remedies known for the removing of freckles.

FREDBERG, a rich, ſtrong, and fine town of Germany, in Miſnia, remarkable for its mines, and for being the burying place of the princes of the houſe of Saxony. It is a delightful place, ſeated on the river Multa. E. Long. 13. 40. N. Lat. 51. 2.

FREDERICA, a town of North America, in Georgia, ſeated at the mouth of the river Alatamaha, lately built and fortified by general Oglethorpe. The iſland it ſtands upon is called *St Simons's;* and is about 13 miles in length and 4 in breadth. W. Long. 81. 35. N. Lat. 31. 0.

FREDEKICK II. the Great, of Pruſſia, one of the greateſt warriors the preſent age has produced, was the ſon of Frederick William then hereditary prince of Brandenburg, and Maria Dorothea, a princeſs of the houſe of Brunſwick. He was born in 1712, the year before his father Frederick I. mounted the throne of Pruſſia. The latter was ſo far from being a patron of literature, that he regarded nothing but what related to the military art; and moſt of his generals, whatever their merits in their own line might be, ſcarce knew how to ſign their names. So great indeed was the ignorance of the monarch himſelf that he baniſhed from his dominions a philoſopher of the name of *Wolf*, merely becauſe he maintained the doctrine of pre-eſtabliſhed harmony; upon which a theologian named *Lange* aſſerted, that on ſuch principles his majeſty's grenadiers were not culpable when they deſerted, it being only the neceſſary conſequence of the impulſe their machine had received from their Creator. His ſon was of a diſpoſition the very reverſe of his father. Being put from his birth under the care of Val de Recoule a French lady of great merit and underſtanding, he acquired, in his early years not only a taſte for literature in general, but a predilection for the French language, which was not obliterated throughout his whole life.

It is not to be ſuppoſed that a prince of the diſpoſition abovementioned, would ſuffer his ſon to be long engaged in literary purſuits. At ſeven years of age, young Frederick was taken out of the hands of Madame de Recoule, and put under the care of military tutors. General Count de Finkeſtein, an old warrior, was appointed his governor; his ſub-governor was Colonel de Kalkſtein, an officer renowned for his courage and experience; he was taught mathematics and fortification by Major Senning; Han de Jendun, a Frenchman, inſtructed him in other branches of knowledge; and a cadet of the name of *Kenzel*, taught him his exerciſe. At eight years of age he was furniſhed with a ſmall arſenal ſtored with all ſorts of arms proportioned to his age and ſtrength, of which his father left him abſolute maſter. In a ſhort time he was named captain and chief of the corps of cadets; and the young prince performed every day, in miniature, with his little ſoldiers, all the evolutions with which his father exerciſed his giants. At laſt he received the command of a company in his father's regiment famous throughout all Europe, and which was compoſed of men of whom ſcarce one was ſhort of ſeven French feet.

Born, however, with a taſte for the arts, he devoted to their cultivation every moment he could eſcape the vigilance of his guardians. He was more particularly fond of poetry and muſic, and when he could find a moment's leiſure, he read French authors, or played on the flute; but his father, as often as he ſurpriſed him playing or reading, broke his flute and threw his books into the fire. The prince, chagrined at ſuch injurious treatment, and having a great deſire to viſit Germany, England, France, and Italy, deſired permiſſion to travel. This, however, his father would not allow, but permitted him to accompany himſelf in the little journeys he made from time to time into Germany; and, in 1728, took him to Dreſden to ſee the king of Poland. By theſe little expeditions the deſire of the prince to viſit other countries was only the more inflamed, ſo that at laſt he formed a deſign of ſetting out without his father's knowledge. The deſign was intruſted to two of the prince's young friends named *Kat* and *Keit*; money was borrowed for the occaſion, and the day of their departure fixed, when unluckily the whole project was diſcovered. The old king, implacable in his reſentment, and conſidering his ſon as a deſerter, determined to put him to death. He was ſhut up in the fortreſs of Cuſtrin; and it was with the utmoſt difficulty that the Count de Seckendorf, ſent for the purpoſe by the emperor Charles VI. was able to alter the king's reſolution. Certain vengeance, however, was determined on both the intended aſſociates in Frederick's journey. Keit eſcaped the danger by flying into Holland; but Kat had not that good fortune. The king firſt directed that he ſhould be tried by a court-martial; but as they, contrary to his expectation, only ſentenced the criminal to perpetual impriſonment, the revengeful monarch by an unheard of exerciſe of the royal prerogative cauſed him to be beheaded. The execution was performed under the windows of the prince royal, whoſe head was held towards the ſcaffold by four grenadiers; but no ſooner did he approach the window and ſee his friend in the hands of the executioner, than he ſtretched out his arms towards him, crying out "Kat! Kat!" and inſtantly fainted away. During the remainder of his life he conſidered capital puniſhments with a great degree of horror, and they were rare throughout the Pruſſian dominions while he continued to reign. When the emperor had ſucceeded in preventing the execution of Frederick, the king remarked, that "Auſtria would one day ſee what a ſerpent ſhe had nouriſhed in her boſom." The royal priſoner remained a year at Cuſtrin; during which time his father wiſhed that he ſhould learn the maxims of government and finance. For this purpoſe M. de Munchow, preſident of the chamber of domains and finances, was ordered to make him aſſiſt at all their aſſemblies, to conſider him as a ſimple counſellor, to treat him as ſuch, and make him work like others. The young counſellor, however, though he aſſiſted at their meetings, did not trouble himſelf with reading acts or copying decrees. Inſtead of this, he amuſed himſelf ſometimes with reading French Pamphlets, and at others with drawing caricaturas of the preſident or members of the aſſembly. M. Munchow himſelf was likewiſe very favourable to the prince at this time, by furniſhing him books and other articles of amuſement, notwithſtanding the expreſs prohibition of his father: though in this he certainly ran a great riſk; for the old king, who ſet but a very light value on human life, would undoubtedly have put him to death had he received intelligence of his complaiſance.

Frederick, after paſſing the time abovementioned in confinement, was recalled to Berlin, on pretence of being preſent at the celebration of his eldeſt ſiſter's marriage with the hereditary prince of Bareith; but the true reaſon was, that the king had now prepared a match for the prince himſelf. This was the princeſs Elizabeth Chriſtina of Brunſwick, niece to the empreſs. Frederick, who was not only totally indifferent to the fair ſex in general, but particularly prejudiced againſt this princeſs, made ſome objections; his father, however, overcame all obſtacles with "his uſual arguments (ſays the author of the life of Frederick), viz. his cane, and a few kicks."

The coldneſs which Frederick at this time ſhowed for the fair ſex, appears not to have been natural; for as early as the year 1723, though then only in the 11th year of his age, he is ſaid to have fallen in love with the princeſs Anne, daughter of George II. Even at this early period he entered into vows to refuſe every other but her for his conſort; nor were theſe ever broken, as far as depended on himſelf. The marriage perhaps would have taken place, had it not been for ſome differences which aroſe between the courts of Pruſſia and Hanover about a few acres of meadow-land, and two or three Hanoverians enliſted by the Pruſſian recruiters. It is ſuppoſed alſo, that it was intended at one time to marry him to Maria Thereſa of Auſtria; but, as in that caſe it would have been neceſſary to change his religion, Frederick derived from thence a plauſible pretence for refuſing the match. The princeſs whom he eſpouſed had a large ſhare of beauty; and, what was ſtill better, an excellent heart: but Frederick is ſaid to have ſuffered ſo much in his former amours, that certain natural and unſurmountable impediments remained to the completing of his marriage with any woman. Scarcely therefore was he in bed with his young ſpouſe, when a cry of *Fire!* was raiſed by his friends. Frederick got up to ſee where the conflagration was: but finding it to be a falſe alarm, he ſent meſſengers to compoſe the princeſs; but neither that night, nor any other, did he think proper to diſturb her reſt.

On occaſion of this marriage, Frederick received from his father the county of Rupin. He reſided in the capital of this county, named alſo *Rupin*, for ſome time; but afterwards choſe Rheinſberg for his place of abode. This is a little town built in the ſands, on the confines of Mecklenburg, and at that time containing only 1000 inhabitants; but it was ſoon greatly improved by Frederick. Having put over the great gate of the caſtle, however, the following inſcription, FREDERICO TRANQUILLITATEM COLENTI, his father was diſpleaſed with it, and therefore hurried him from his peaceful retreat into the noiſe and tumult of war. At this time the ſucceſſion to the crown of Poland had kindled a general war throughout Europe, and the king of Pruſſia was to ſend 10,000 auxiliaries to the imperial army, then commanded by prince Eugene. The king conducted his troops in perſon, and reſolved to take this opportunity of giving his ſon an idea of war. At this time, however, he learnt but little; and only ſaw, as he himſelf expreſſes it, the ſhadow of the great Eugene. That conſummate general, nevertheleſs, did not overlook his merit; but predicted that he would one day be a great captain. Frederick having gone to reconnoitre the lines at Philipſburg, in his return through a very open wood, was expoſed to the cannon of the lines, which thundered inceſſantly. The balls broke a number of branches on every ſide of him: notwithſtanding which, he never cauſed his horſe move quicker; nor did his hand which held the bridle ever alter its motion even for a moment. He continued to converſe quietly with the generals who attended him, and never ſhowed the ſmalleſt ſign of apprehenſion. Being one night at ſupper with field-marſhal Grumkow, the converſation turned on the young prince Eugene who died on the Rhine; and he was aſked whether that prince would ever have become a great man? Frederick decided in the negative, on account of young Eugene's not having known at any period of his life how to chooſe a friend who dared to tell him the truth.

During this campaign the health of the old king was ſo much impaired, that he was obliged to leave the army; and Frederick, on his return, was for ſome time intruſted with ſigning all the orders in his father's name. On the king's recovery the prince was ſent to Stetten, under the care of the prince of Deſſau, that he might ſee the fortifications of that town. He was afterwards permitted to go to Konigſberg to ſee the unfortunate Staniſlaus, who had taken refuge in that place, and who was no leſs remarkable for his philoſophy and conſtancy than for his misfortunes. With him Frederick remained for ſome weeks, and contracted a friendſhip which was not diſſolved but by the death of Staniſlaus. At laſt he was allowed to return to his peaceful manſion at Rheinſberg, where he remained till the death of his father. In this place his time was occupied alternately by the ſtudy of the ſciences, the cultivation of the arts, and the pleaſures of friendſhip. Philoſophy, hiſtory, politics, the military art, poetry and muſic, agreeably ſucceeded each other, and had each its ſtated period. The prince paſſed the greateſt part of the day in his library; and the remainder in the ſociety of a ſelect company of agreeable and learned men. The principal of theſe were Chaſot, a French officer; Kayſerling, a gentleman of Courland, on whom the prince beſtowed the name of *Cæſarion*; Jordan, a French refugee; and Knobelſdorf, director of the buildings and gardens; but who could converſe on all the arts of deſigning with as much taſte as judgement.—In theſe meetings, gaiety generally preſided; there were generals to ſpeak of war, muſicians to form concerts, and excellent painters to decorate the apartments. Whilſt Knobelſdorf was executing landſcapes and laying out the gardens, Peſne was immortalizing himſelf by his cielings, and du Buiſſon by his pictures of flowers. The two Grauns compoſed excellent muſic, or directed the orcheſtra; and Benda, one of the firſt violins of Europe, accompanied the prince who played extremely well on the flute. The morning was uſually dedicated to ſtudy; gaiety and agreeable converſation prevailed at every repaſt; and every evening there was a little concert. In this retreat Frederick conceived that ardent paſſion for military glory and the aggrandiſement of his kingdom for which he became at laſt ſo remarkable; and here he is ſuppoſed to have formed the moſt ſublime and daring projects. He was fired with a deſire of imitating the celebrated heroes of antiquity, of whom he read in the ancient authors, and for which he ſet apart ſome hours every day. Amongſt the works which he read almoſt every year, were Herodotus, Thucydides, Xenophon, Plutarch, Tacitus, Salluſt, Livy, Quintus Curtius, Cornelius Nepos, Valerius Maximus, Polybius, Cæſar Vegetius, &c. He never ſpoke but with enthuſiaſm of the great warriors of Greece and Rome; and when ſeated on the throne, thought he could never diſtinguiſh an able ſoldier in a more honourable manner than by conferring on him a Roman ſurname. Hence he diſtinguiſhed, by the name of *Quintus Icilius*, M. Guichard who had written ſome treatiſes on the military art of the ancients; giving him at the ſame time a free battalion. This name of *Quintus Icilius* was retained by M. Guichard as long as he lived.

In his purſuit of glory Frederick found that it was not improper to cultivate the friendſhip of celebrated poets, philoſophers, and others of the literary claſs; for which purpoſe he flattered, commended, and complimented all the moſt celebrated literati of Europe at that time. "The philoſophers (ſays the author of his life) anſwered him as a mad lover writes to his miſtreſs. They wrote to him that he was a great poet, a great philoſopher, the *Solomon* of the north. All theſe hyperboles were printed; and Solomon was not ſorry for it, though he had too much underſtanding to believe in them. Wolf, Rollin, Graveſande, Maupertuis, Algarotti, Voltaire, were honoured with his correſpondence. The laſt eſpecially, accuſtomed to offer up incenſe to the idol of the day were it tranſported from the dunghill to the altar, did not fail to exalt as the firſt man of the univerſe, a prince who was in expectancy of the throne, and who aſſured him that he was the greateſt philoſopher of the age and the firſt poet in the world."

That Frederick might keep up his character with the literati, or perhaps from a real predilection for his principles, he patroniſed the Apology of Wolf, and had his principal treatiſes tranſlated into French. He even prevailed upon his father to relax a little in favour of that philoſopher. A commiſſion of reformed and Lutheran theologians was appointed in 1736, to examine into the tenets of that unfortunate philoſopher. Wolf was declared innocent, and a letter was ſent to him at Marpourg containing an invitation to return; but the philoſopher did not think proper to make his appearance till the year 1740, when his protector was ſeated on the throne.

During his reſidence at Rheinſburg, Frederick compoſed his refutation of the principles of Machiavel, under the title of *Anti-Machiavel*; of which he ſent the manuſcript to Voltaire to correct, and to get printed.

The old king, now almoſt worn out with infirmity, ſaw with regret the predilection his ſon entertained for men of letters; and, in his peeviſh fits, often threatened the whole ſociety with confinement in the fortreſs of Spandau. Theſe threats frequently occaſioned a violent alarm among the joyous company at Rheinſberg, which it required all the eloquence of Frederick to quiet. Their apprehenſions on this account, however, were ſoon removed. At the commencement of the year 1740, the king's diſorder increaſed to a great degree, and in the month of May his caſe became deſperate. He lived, however, till the 31ſt of that month, when he expired, and left the throne to his ſon Frederick II.

The acquiſition of a kingdom did not abate Frederick's paſſion for literature, though to this he was now obliged to ſuperadd the qualities and labours of a great king. A conſideration of his tranſactions in this character falls under the article PRUSSIA, to which we refer: theſe, indeed, ſo totally engroſſed the remaining part of his life, that little more remains to be ſaid under this article, than to relate ſome anecdotes by which we may be in ſome meaſure able to trace the character of this great and ſingular perſonage.

It has already been mentioned, that in the early part of his life, Frederick had conceived a great inclination to travel. This paſſion ſeems not to have been extinguiſhed by the ſplendor of his new ſituation; for having, ſoon after his acceſſion, gone into Pruſſia and Weſtphalia to receive the homage of the inhabitants, he formed a reſolution of proceeding *incognito* as far as Paris. Being diſcovered at Straſbourg, however, he laid aſide the deſign of proceeding to Paris, and went to ſee his ſtates in Lower Germany. Here he wrote the celebrated Voltaire, that he ſhould come *incognito* to viſit him at Bruſſels; but being ſeized with an indiſpoſition in the little palace of Meuſe, two leagues from Cleves, he wrote again to that philoſopher, informing him that he expected he ſhould make the firſt advances. The following curious account is given by him of his reception, &c. “The only guard I found at the gate was one ſoldier. The privy-counſellor, Bambonet, was cooling his heels in the court: he had large ruffles of dirty linen; a hat full of holes; and an old magiſterial peruke, one end of which deſcended as low as his pockets, and the other ſcarcely reached his ſhoulder. I was conducted into his majeſty's apartment, where there was nothing but bare walls. I perceived in a cabinet, by the glimmering of a taper, a truckle bed, two feet and an half wide, on which lay a little man muffled up in a night gown of coarſe blue cloth. This was the king, in a ſtrong perſpiration, and even trembling under a wretched blanket in a violent fit of the ague. I bowed to him; and began by feeling his pulſe, as if I had been his firſt phyſician. The fit over, he dreſſed himſelf and ſat down to table. Algarotti, Kayſerling, Maupertuis, the king's miniſter to the States General, and myſelf, were of the party; where we converſed profoundly on the immortality of the ſoul, on liberty, and the androgynes of Plato.”

This rigid œconomy, and contempt of every luxury with regard to his own perſon, was maintained by Frederick as long as he lived. The following account, taken likewiſe from Voltaire, will give an idea of his manner of living. “He roſe at five in the morning in ſummer, and ſix in winter. A lacquey came to light his fire, and dreſs and ſhave him; and indeed he almoſt wholly dreſſed himſelf. His room was not inelegant. A rich baluſtrade of ſilver, ornamented with little cupids, ſeemed to incloſe an alcove bed, the curtains of which were viſible; but behind them, inſtead of a bed, there was a library: the king ſlept on a truckle bed with a ſlight mattreſs concealed behind a ſcreen. Marcus Aurelius and Julian, thoſe apoſtles of Stoiciſm, did not ſleep in a more homely manner. At ſeven his prime miniſter arrived with a great bundle of papers under his arm. This prime miniſter was no other than a clerk who had formerly been a ſoldier and valet de chambre. To him the ſecretaries ſent all their diſpatches, and he brought extracts of them, to which the king wrote anſwers in two words on the margin: and thus the affairs of the whole kingdom were expedited in an hour. Towards eleven the king put on his boots, reviewed his regiment of guards in the garden, and at the ſame hour the colonels were following his example in their reſpective provinces. The princes his brothers, the general officers, and one or two chamberlains, dined at his table; which was as good as it could be in a country where there is neither game, tolerable butcher's meat, nor a pullet, and where the very wheat is brought from Magdebourg. After the repaſt he retired alone into his cabinet, where he made verſes till five or ſix o'clock. Then came a young man named D'Arget, formerly ſecretary to Valory the French envoy, who read to him. A little concert began at ſeven, in which the king played on the flute with as much ſkill as the firſt performer; and pieces of his compoſition were frequently executed. Supper was ſerved in a little hall, the ſingular and ſtriking ornament of which was a picture the deſign of which he had given to Peſne, one of our beſt colouriſts. It was a fine picture of Priapus. Theſe repaſts were not in general the leſs philoſophic on that account. Never did men converſe in any part of the world with ſo much liberty reſpecting all the ſuperſtitions of mankind, and never were they treated with more pleaſantry and contempt. God was reſpected; but none of thoſe who had deceived men in his name were ſpared. Neither women nor prieſts ever entered the palace. In a word, Frederick lived without a court, without counſel, and without religious worſhip.”

As Frederick had eſpouſed his princeſs entirely contrary to his inclination, it was imagined that on his acceſſion to the throne he would embrace the opportunity of ſetting himſelf free from engagements ſo diſagreeable to himſelf. The queen was not without ſuſpicions of this kind, inſomuch that ſhe was on the point of fainting away when he made his firſt viſit to her. To the ſurpriſe of all parties, however, he made her a very affectionate ſpeech, apologizing for his indifference, and inviting her to participate with him the throne of which ſhe was ſo worthy. In the firſt year of his reign he reſtored the academy of ſciences at Berlin which had been founded in 1700; but he ſoon became diſguſted with its members, whom he endeavoured at all times to ridicule rather than encourage. His war with the queen of Hungary, however, which took place almoſt immediately after his acceſſion, for ſome time prevented him from taking ſuch an active part in literary matters as he was naturally inclined to do. After the peace, being at liberty to follow his inclination, he gave full ſcope to his paſſion for literature; and in the interval betwixt the concluſion of the firſt war and beginning of that of 1756, he compoſed moſt of the works which are now aſcribed to him. At this time he wrote his *Hiſtory of my own Time*, afterwards announced among his poſthumous works. In writing hiſtory he acquired a taſte for hiſtorians; and juſtly gave the preference to the ancients, the moſt celebrated of whoſe works he peruſed every year. Voltaire was his principal literary correſpondent, whom he invited to reſide with him. Afraid of loſing his liberty, however, that philoſopher heſitated, excuſed himſelf, and entered into pecuniary treaties, firſt for himſelf, and afterwards for his niece Madam Dennis, whom he wiſhed to accompany him. At laſt he was determined by ſeeing a poem from Frederick to M. D'Arnaud, in which the latter was compared to the riſing, and Voltaire to the ſetting, ſun. By this Voltaire was ſo much piqued, that he ſet out for Berlin without delay, and arrived there in June 1750. He was received in the moſt magnificent and affectionate manner, and for ſome time his ſituation was very agreeable: but the diſputes and rivalſhip which took place betwixt him and Maupertuis ſoon threw every thing into confuſion. In theſe the king interfered in ſuch a manner as was certainly below his dignity; and he often exerciſed himſelf in making a jeſt of the other men of letters in a way exceedingly diſguſting, and which induced many of them to leave him. The ſquabbles with Voltaire were ſometimes very diverting; an account of ſome of which is given under the article VOLTAIRE. They ended at laſt in a final quarrel with that wit, and his departure from the kingdom. The reſtleſs diſpoſition of Frederick ſhowed itſelf after his departure, by his attempts to provoke the literati who remained at his court to quarrel with him as Voltaire had been accuſtomed to do. But they were of too paſſive a diſpoſition to gratify him in this reſpect, chooſing rather to ſuffer the moſt mortifying ſtrokes of raillery, or to leave the kingdom altogether, than to contend with him. This proved ſo uneaſy to the king, that he one day exclaimed, "Shall we have no more quarrels then?" The breaking out of the war in 1756, however, put a ſtop to this diverſion, and afforded him as many enemies as he could wiſh. The exploits he performed during the ſeven years which this unequal conteſt laſted, are almoſt incredible*; and it is amazing how the fortitude and reſolution of any perſon could enable him to ſuſtain the difficulties which during this period he had to encounter. In one fatal moment, indeed, even the reſolution of Frederick was on the point of giving way. This happened after the battle of Colin, when his affairs ſeemed altogether deſperate, before they were retrieved by the victory at Roſbach. At this time he wrote to his ſiſter at Bareith, that he was on the point of putting an end to his own life; but as this reſolution did not extinguiſh in him the love of glory, he wiſhed to have it ſaid that he made verſes on the brink of the grave. With this view he wrote a long poetical epiſtle to the marquis d'Argens, in which he communicated to him his deſign, and bade him farewell.

Happily, at laſt, the king's affairs took a better turn, and ſuch deſperate thoughts were laid aſide. His conſtitution, however, was irreparably injured by the exceſſive fatigues he had ſuſtained. Soon after the concluſion of the peace, his body began to bend, and his head to incline to the right ſide: by degrees he became very infirm; he was tormented with the gout, and ſubject to frequent indigeſtions. All his diſtempers, however, were borne with invincible patience; and, till a very ſhort time before his death, he never ceaſed to attend his reviews, or viſit the different provinces of his dominions. He has been known to review his troops, and gallop through all the ranks, as if he felt no pain, notwithſtanding that an abſceſs which had broken out upon him, and approached to a ſuppuration, frequently, upon ſuch occaſions, touched the ſaddle. In Auguſt 1785 he impaired his health ſtill farther by aſſiſting at a review, where he was expoſed without even a cloak to a heavy rain for four or five hours. On his return to Potzdam he was ſeized with a fever; and, for the firſt time, became unable to aſſiſt at the military exerciſes of Potzdam, which take place in September. His malady, however, did not prevent him from dictating the diſpoſition of theſe exerciſes during the three days they laſted, and he always gave the word in preſence of his generals and the foreigners of diſtinction then at Potzdam. About the end of autumn the fever left him, but was ſucceeded by a violent cough; and he continued free from the gout which had uſually attacked him at this ſeaſon. He was greatly weakened by the cough, which prevented him from ſleeping; but this did not in the leaſt interrupt him in the execution of buſineſs. Every morning, at four or five o'clock, he ordered the three cabinet ſecretaries to enter his apartment, where he dictated anſwers to their papers. It was not till after the diſpatch of all his affairs that he ſaw a ſurgeon, or ſometimes a phyſician, though he had a bad opinion of the phyſicians in general, whom he conſulted on his diſtemper. In the evening he amuſed himſelf from five to eight with ſome of his ſociety; and after that hour he paſſed the remainder of the time before he went to reſt, in hearing ſome ancient authors read to him; and thus he continued to employ himſelf till the very day before he died. On the 17th and 18th of May 1786, he was unable to aſſiſt at the ordinary reviews, but ſtill he hoped to be preſent at thoſe of Sileſia. He ſeveral times attempted to mount his horſe to go to the parade at Potzdam; but finding his powers inſufficient, he was obliged to return, after having proceeded a few paces. He made other attempts, but with as little ſucceſs; and at laſt his diſorder terminated in a dropſy. Being now no longer able to remain in bed, he ſat day and night in an arm chair with ſprings which could be moved at pleaſure. For near a month before his death the ſwelling of his feet gave him violent pain, ſo that he wiſhed an inciſion to be made; but the ſurgeon refuſed to perform the operation, ſuſpecting that it might haſten his death. Nature, however, accompliſhed his deſires; his right leg opened, and diſcharged ſuch a quantity of matter, that he was greatly relieved; and thoſe unacquainted with the medical art began to entertain hopes of his recovery. The phyſicians, however, were of a very different opinion; and the event juſtified their apprehenſions. On the 16th of Auguſt 1786 his throat began to rattle violently, and his attendants expected every moment that he would breathe his laſt. In this ſituation his three ſecretaries entered the room for the diſpatch of buſineſs as uſual. Even then Frederick made an effort to collect his force, giving them a ſign to wait, as if he would ſpeak with them in a ſhort time. This, however, was the laſt he could make: for he ſoon after fell into a ſtupor; though from this he recovered ſo far as to be able to ſpeak. In the evening he aſked what o'clock it was? and on being anſwered that it was nine, he ſaid, "Well then I am going to reſt." His reſpiration and voice became gradually more feeble; and he expired on Thurſday at 19 minutes after two in the morning, without any convulſion or ſymptom of pain.

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* See *Pruſſia.*

This great monarch was of the middle ſize, had large blue eyes and a piercing look. He ſpoke German incorrectly, and in a very rough manner; but talked French very fluently, and his voice was then mild and agreeable. His conſtitution was naturally feeble, but he had greatly improved it by his activity and laborious life. He had the art of relieving every one from that embarraſſment which frequently occurred in accoſting ſuch a celebrated monarch; and it ſeems probable that he himſelf conſidered on what he ſhould ſay to any illuſtrious perſon who happened to come to his court. His univerſal knowledge enabled him to converſe on all ſubjects; and thus he talked of war with military men, of verſes with the poet, of agriculture with the farmer, juriſprudence with the lawyer, commerce with the merchant, and politics with the Engliſhman. He had a very retentive memory; was fond of ſolitude and gardening; and likewiſe took great pleaſure in dogs, of which animals he conſtantly kept a number about him, giving them little balls covered with leather to play with. In company, he was fond of aſking queſtions and jeſting; in which laſt he proceeded ſuch lengths as undoubtedly were unbecoming in a ſuperior towards his inferiors, who would not have failed to reſent ſuch jokes from perſons more on an equality with them. In military affairs he was exceſſively ſevere, not to ſay cruel; of which the following anecdote may ſerve as an inſtance. In the firſt war of Sileſia, wiſhing to make ſome alterations in his camp during the night, he forbade every perſon, under pain of death, to keep, after a certain hour, a fire or other light in his tent. He himſelf went the rounds; and in paſſing the tent of a captain Zeitern he perceived a light. Entering the tent, he found the captain ſealing a letter to his wife, for whom he had a great affection. "What are you doing there? (ſays the king:) Do you not know the order?" The captain fell on his knees and aſked pardon, but did not attempt to make any excuſe. "Sit down (ſays Frederick), and add a few words I am going to dictate to you." Zietern obeyed; and the king dictated, "To-morrow I ſhall periſh on a ſcaffold." The unfortunate man wrote them, and next day was executed. In matters of domeſtic legiſlation, he was more arbitrary than juſt; of which we have a notable example in the famous caſe of Arnold the miller. The man had refuſed to pay the rent of the mill he poſſeſſed, on pretence that the ſtream which turned it had been diverted into a fiſh-pond. This was evidently a frivolous excuſe; becauſe the water which ran into the pond alſo ran out of it into the ſame channel as before, ſo that nothing could be loſt except what evaporated from the ſurface of the fiſh-pond. The judges therefore gave ſentence againſt the miller; but the king not only reverſed their ſentence, but diſgraced them. For this he was celebrated through all the news-papers in Europe; and yet he was in the wrong, and afterwards even acknowledged himſelf to have been ſo: but, notwithſtanding he knew his error, he not only made no reparation to the parties he had injured, but allowed them to lie in priſon at Spandau all his lifetime, ſo that they were not releaſed till the commencement of the preſent reign He entertained certain and almoſt unaccountable prejudices againſt certain places and perſons, which neither conduct nor merit could eradicate. One of theſe unfortunate places was Weſtphalia, on which he never conferred any bounty: and one day a native of that country, a man of great merit, being propoſed to him for a place, he refuſed, ſaying, "He is a Weſtphalian; he is good for nothing." Voltaire accuſes him of ingratitude to the Count de Seckendorf; who, as we have already ſeen, ſaved his life, and againſt whom he afterwards conceived the moſt implacable hatred. His indifference towards thoſe who afforded him the moſt eſſential ſervice, was evident: when a robuſt butcher prevented him from falling, horſe and all, over a precipice, where both would have undoubtedly been killed; the king, ſenſible of the aſſiſtance that had been afforded him, turned about, and ſaying, "Thank you, friend," rode off without ever inquiring farther about the perſon who had juſt preſerved him from deſtruction.

With regard to the literary merits of this monarch, we certainly cannot pronounce them extraordinary. Voltaire boaſts of having corrected his works, and others of having furniſhed him with materials for his hiſtory. He has been accuſed of borrowing whole hemiſtichs of poetry from Voltaire, Boileau, Rouſſeau, and others; nor does the charge appear to be at all void of foundation. Such of his verſes as appear to have undergone no correction, are very indifferent, nor indeed can we pronounce any of his poetic works to be of the firſt rate. In the former part of his life he entertained a great partiality for the French learning and language: but as he advanced in years, he entirely loſt this predilection, and inclined much more to favour the Engliſh and Germans. Towards the end of his life, indeed, he affected a contempt for the French, without whom it is ſaid he would ſcarce ever have made any figure except in the military line.

FREDERICKSBURG, in Virginia. See APPENDIX.

FREDERICKSBURG, a fort and colony of Brandenburg, on the gold-coaſt of Guinea, in Africa, near Cape Three-points, and about 75 miles from

Cape Coaſt. It mounts 46 pieces of cannon on four batteries; and formerly belonged to the Pruſſians, but is now ſubject to Denmark. W. Long. 1. 15. N. Lat. 4. 30.

FREDERICKSHALL, or FREDERICKSTADT, a ſtrong town of Norway, in the prefecture of Agerhuys, where Charles XII. king of Sweden was killed by a muſket-ball in 1718, when he was beſieging this town. It is ſeated on the coaſt of the Catagate, in E. Long. 10. 45. N. Lat. 59. 2.

FREDERICKSODE, a town of Denmark, in Jutland, taken by the Swedes in 1657, but now ſubject to Denmark. It is ſeated near the ſea, in E. Long. 10. 0. N. Lat. 55. 42.

FREDERICKSTADT, a town of Denmark, in South Jutland, built in 1621. It is ſeated on the river Eyder, in E. Long. 9. 23. N. Lat. 55. 32.

FREDERICKSTADT, a town of Norway, in the province of Agerhuys, ſeated on a bay of the ſea, near the frontiers of Sweden, in E. Long. 11. 6. N. Lat. 59. 12.

FREE, in a general ſenſe, is uſed in oppoſition to whatever is conſtrained or neceſſitated. When applied to things endowed with underſtanding, it more peculiarly relates to the liberty of the will.

FREE-Bench, ſignifies that eſtate in copy-hold which the wife, being eſpouſed a virgin, has after the deceaſe of her huſband for her dower, according to the cuſtom of the manor.

In regard to this free-bench, different manors have different cuſtoms: and in the manor of eaſt and weſt Enbourne in the county of Berks, and in other parts of England, there is a cuſtom, that when a copyhold tenant dies, the widow ſhall have her free-bench in all the deceaſed huſband's lands, *dum ſola & caſta fuerit*, "whilſt ſhe lives ſingle and chaſte;" but if ſhe is found to be guilty of incontinency, ſhe ſhall forfeit her eſtate. Nevertheleſs, upon her coming into the court of the manor riding backwards on a black ram, with his tail in her hand, rehearſing a certain form of woods, the ſteward is bound by cuſtom to reſtore her to her free-bench. The words are,

Here I am,
Riding on a black Ram,
Like a whore as I am;
And for my crincum crancum
Have loſt my bincum bancum,
And for my tail's game
Have done this worldly ſhame:
Therefore, pray Mr Steward, let me have my land again.

FREE or *Imperial Cities* in Germany, are thoſe not ſubject to any particular prince; but governed, like republics, by their own magiſtrates.

There were free cities, (*liberæ civitates*), even under the ancient Roman empire: ſuch were thoſe to whom the emperor, by the advice or conſent of the ſenate, gave the privilege of appointing their own magiſtrates, and governing themſelves by their own laws. See CITY.

FREE Fiſhery. See *Free* FISHERY.

FREE Warren. See WARREN.

FREE-Maſon. See MASON.

FREE-Stone, a whitiſh ſtone, dug up in many parts of Britain, that works like alabaſter, but is more hard and durable; being of excellent uſe in building, &c. It is a kind of the grit ſtone, but finer ſanded and ſmoother; and is called *free*, from its being of ſuch a conſtitution as to cut freely in any direction.

The qualities of the ſeveral kinds of free-ſtones uſed in the different parts of Europe are very different. They all agree in this general property indeed, that they are ſofter while in the quarry, than when they have been ſome time expoſed to the air: but even this general property differs greatly in degree. They have a ſort of grey free-ſtone in uſe at Paris (of which we do not yet ſeem to have met with any in this country), which has the abovementioned quality in ſo great a degree, that the expence of working it is in a great meaſure ſaved.

This ſtone lies every-where on the ſouth-ſide of the river Seine, and is of a coarſe and large grit. It is ſo ſoft when newly taken out of the ſtrata, that they faſhion it very conveniently with a ſort of broad ax, and form as many ſtones for building in this manner in an hour, as an equal number of our people do in a day or two. Though this ſtone is as ſoft as dry clay when firſt taken up, it is found to harden ſo conſiderably in the air, that it becomes more than equal to the ordinary free-ſtone.

The Portland ſtone of the fineſt kind, which is white, and of a cloſe grit, is very fit for hewing and carving; but it will neither reſiſt water nor fire, which is a very ſingular inſtance in ſo denſe a ſtone; while the free-ſtone of Kent, which is leſs beautiful to the eye, and is of a greyiſh colour, and conſiderably cloſe, though of a larger grain, reſiſts the air and water very well. The free-ſtone of Derbyſhire, on the other hand, is ſo brittle as to be unfit for any fine working; and ſo coarſe and open in its texture, that it lets water through: yet it bears the fire extremely well, and is fit for ovens, hearths, &c.

FREEBOOTER, or FLIBUSTER, a name given to the pirates who ſcour the American ſeas, particularly ſuch as make war againſt the Spaniards. See BUCANEER.

FREEDOM, in general, the ſtate or quality of being free. See LIBERTY.

FREEDOM of a Corporation, the right of enjoying all the privileges and immunities belonging to it. See CORPORATION.

The freedom of cities, and other corporations, in Britain, is regularly obtained by ſerving an apprenticeſhip; but it is alſo purchaſed with money, and ſometimes conferred by way of compliment.

FREEDOM of Conſcience. See TOLERATION.

FREEDOM of the Will, that power or faculty of the mind, whereby it is capable of acting or not acting, chooſing or rejecting whatever it judges proper †. Of this every man muſt be ſenſible, who finds in himſelf a power to begin or forbear, continue or end ſeveral actions, barely by a thought or preference of the mind.

FREEHOLD, FRANK TENEMENT, (*liberum tenementum*), is land, or tenement, which a man holds in *fee-ſimple*, *fee-tail*, or for term of life. See FEE and TAIL.

Freehold is of two kinds, in *deed* and in *law*.

The firſt is the real poſſeſſion of land or tene-

† See *Metaphyſics*.

ment in fee, fee tail, or for life: the other is the right a man has to ſuch land or tenement before his entry or ſeizure.

A freehold, by the common law, cannot commence *in futuro;* but it muſt take effect preſently, either in poſſeſſion, reverſion, or remainder. Whatever is part of the freehold goes to the heir; and things fixed thereto may not be taken in diſtreſs for rent, or in execution, &c. No man ſhall be diſſeiſed of his freehold by ſtat. Magna Charta, cap. 29. but by judgment of his peers, or according to the laws of the land: nor ſhall any diſtrain freeholders to anſwer for their freehold, in any thing concerning the ſame, without the king's writ. Freehold eſtates, of certain value, are required by ſtatutes to qualify jurors, electors of the knights of the ſhire in parliament, &c.

FREEHOLD is likewiſe extended to ſuch offices as a man holds in fee, or for life.

FREEHOLD is alſo ſometimes taken in oppoſition to villenage.

Lambard obſerves, that land, in the Saxons time, was diſtinguiſhed into *bockland,* i. e. holden by book or writing; and *folkland,* held without writing. The former, he ſays, was held on far better condition, and by the bettter ſort of tenants, as noblemen and gentlemen; being ſuch as we now call *freehold:* the latter was moſtly in poſſeſſion of peaſants; being the ſame with what we now call *at the will of the lord.*

In the ancient laws of Scotland, freeholders are called *milites,* "knights." In Reg. Judicial. it is expreſſed, that he who holds land upon an execution of a ſtatute merchant, until he hath ſatisfied the debt, *tenet ut liberum tenementum ſibi et aſſignatis ſuis;* and the ſame of a tenant *per eligit:* the meaning of which ſeems to be, not that ſuch tenants are freeholders, but as freeholders for the time, till they have received profits to the value of their debt.

FREETHINKER. See DEIST.

FREEZE, FRIEZE, or *Frize,* in commerce. See FRIZE.

FREEZE, in architecture, that part of the entablature of columns, between the architrave and corniche.

The freeze is properly a large flat face, or member, ſeparating the architrave from the corniche.

The ancients called it *zoophorus,* (ζωοφορος,) becauſe it was uſually enriched with figures of animals; and our denomination *freeze* has a like origin, being formed of the Latin *phrygio,* "an embroiderer," becauſe it is commonly adorned with ſculptures in baſſo-relievo, imitating embroidery.

FREEZING, in philoſophy, the ſame with congelation. See CONGELATION, FROST, and ICE.

FREEZING Rain, or *Raining Ice,* a very uncommon kind of ſhower, which fell in the weſt of England, in December 1672; whereof we have divers accounts in the Philoſophical Tranſactions.

This rain, as ſoon as it touched any thing above ground, as a bough or the like, immediately ſettled into ice; and by multiplying and enlarging the icicles, broke all down with its weight. The rain that fell on the ſnow immediately froze into ice, without ſinking in the ſnow at all.

It made an incredible deſtruction of trees, beyond any thing in all hiſtory. "Had it concluded with ſome guſt of wind (ſays a gentleman on the ſpot), it might have been of terrible conſequence. I weighed the ſprig of an aſh tree, of juſt three-quarters of a pound; the ice on which weighed 16 pounds. Some were frighted with the noiſe in the air; till they diſcerned it was the clatter of icy boughs, daſhed againſt each other." Dr Beale obſerves, that there was no conſiderable froſt obſerved on the ground during the whole; whence he concludes, that a froſt may be very intenſe and dangerous on the tops of ſome hills and plains; while in other places it keeps at two, three, or four feet diſtance above the ground, rivers, lakes, &c. and may wander about very furious in ſome places, and remiſs in others not far off. The froſt was followed by glowing heats, and a wonderful forwardneſs of flowers and fruits.

FREIGHT, in navigation and commerce, the hire of a ſhip, or a part thereof, for the conveyance and carriage of goods from one port or place to another; or the ſum agreed on between the owner and the merchant, for the hire and uſe of a veſſel. See *Maritime* LAWS.

FREIND (John), a moſt learned Engliſh phyſician and writer in the 18th century, was born at Croton, Northamptonſhire, in 1675. In 1696, he publiſhed, in conjunction with Mr P. Foulkes, an edition of two Greek orations, one of Æſchines againſt Cteſiphon, and the other of Demoſthenes *de Corona,* with a new Latin verſion. In 1699, he wrote a letter to Dr Sloane concerning an *Hydrocephalus,* publiſhed in the Philoſophical tranſactions: and another letter in Latin to the ſame gentleman, *De ſpaſmis rarior. hiſtoria,* printed in the ſame tranſactions. In 1708, his *Emmenalogia* appeared; which gained him great reputation. In 1704, he was choſen profeſſor of chemiſtry in the univerſity of Oxford. In 1705, he attended the earl of Peterborough to Spain, as phyſician to the army there; and upon his return in 1707, publiſhed an account of the earl's expedition and conduct. In 1709, he publiſhed his Chemical Lectures. In 1712, he attended the duke of Ormond in Flanders, as his phyſician. In 1716, he was admitted a fellow of the college of phyſicians in London. This year he publiſhed the firſt and third books of Hippocrates *De morbis popularibus,* with a Commentary on Fevers, written by himſelf. He ſat a member of the borough of Launceſton in Cornwall in 1722, where he diſtinguiſhed himſelf by his oppoſition to the adminiſtration. March 1722, he was committed to the tower on a charge of high-treaſon: and while he was under confinement, he wrote a Latin epiſtle to Dr Mead, *De quibuſdam variolarum generibus;* and began his Hiſtory of Phyſic, the firſt part of which was publiſhed in 1725, and the ſecond in 1726. Upon the acceſſion of George II. to the throne, he was appointed phyſician in ordinary to the queen, who ſhowed the utmoſt regard and eſteem for him. He died at London in 1728. His works were publiſhed together in Latin at London, 1733, in folio, and dedicated to the queen.

FREINSHEMIUS, a learned and elegant author, born at Ulm in 1608. He made Supplements to Livy, Tacitus, and Q. Curtius, in 60 books, printed at Straſburg in 1654. He wrote likewiſe notes upon Q. Curtius, Florus, Tacitus, and ſome other Latin authors; and died in 1660.

FREITS. See Freats.

FRENCH, in general, ſomething belonging to France: thus we ſay, the French language, French cuſtoms, polity, &c.

The French language, as it now ſtands, is no original or mother language, but a medley of ſeveral. Thoſe that prevail moſt, and which are, as it were, the baſis thereof, are, 1. The Celtic; whether that were a particular language itſelf, or whether it were only a dialect of the Gothic, as ſpoke in the weſt and north. 2. The Latin, which the Romans carried with them into Gaul, when they made the conqueſt thereof. And, 3. The Teutonic, or that dialect of the Teutonic ſpoke by the Franks, when they paſſed the Rhine, and eſtabliſhed themſelves in Gaul. Of theſe three languages, in the ſpace of about thirteen hundred years, was the preſent French formed, ſuch as it is now found. Its progreſs was very ſlow; and both the Italian and Spaniſh were regular languages long before the French.

Paſquier obſerves, it was under Philip de Valois, that the French tongue firſt began to be poliſhed; and that, in the regiſter of the chamber of accounts of that time, there is a purity ſeen almoſt equal to that of the preſent age. However, the French was ſtill a very imperfect language till the reign of Francis I. the cuſtom of ſpeaking Latin at the bar, and of writing the public acts and inſtruments of the courts of juſtice in that language, had made them overlook the French, their own language. Add, that the preceding ages had been remarkable for their ignorance, which was owing, in good meaſure, to the long and calamitous wars which France had been engaged in: whence the French nobleſſe deemed it a kind of merit not to know any thing; and the generals regarded little whether or no they wrote and talked politely, provided they could but fight well.

But Francis I. who was the reſtorer of learning, and the father of the learned, changed the face of things; and after his time, Henry Stevens printed his book, *De la Precellence du Language François*. The change was become very conſpicuous at the end of the 16th century; and under Henry IV. Amyot, Coeffeteau, and Malherbe, contributed towards bringing it to its perfection; which the Cardinal De Richelieu completed, by the eſtabliſhment of the French academy; an aſſembly, wherein the moſt diſtinguiſhed perſons of the church, the ſword, and the gown, have been members. Nor did the long reign of Louis XIV. contribute a little to the improvement of the language: the perſonal qualities of that prince, and his taſte for the fine arts, and that of the princes of the blood, rendered his court the politeſt in Europe. Wit and magnificence ſeemed to vie; and his generals might have diſputed with the Greeks, Romans, &c. the glory of writing well, if they could not that of fighting. From court, the elegance and purity of the language ſoon ſpread itſelf into the provinces; and now there is ſcarce any body there who does not write and ſpeak good French.

One of the characters of the French language is, to be natural and eaſy. The words are ranged in it much in the ſame order as the ideas in our minds; in which it differs exceedingly from the Greek and Latin, where the inverſion of the natural order of words is reputed a beauty. Indeed the Hebrew ſurpaſſes even the French in this point; but then it comes ſhort of it in copiouſneſs and variety.

It muſt be added, however, that as to the analogy of grammar, and the ſimplicity wherewith the moods of verbs are formed, the Engliſh has the advantage not only over the French, but over all the known languages in the world; but then the turns, the expreſſions, and the idioms, of the Engliſh, are ſometimes ſo quaint and extraordinary, that it loſes a good deal of the advantage which its grammatical ſimplicity gives it over the reſt.

The French has but few compound words; wherein it differs widely from the Greek, High Dutch, and Engliſh. This the French authors own a great diſadvantage in their language; the Greek and Dutch deriving a great part of their force and energy from the compoſition of words, and frequently expreſſing that in one ſounding word, which the French cannot expreſs but by a periphraſis. The diminutives in the French are as few as the compounds; the greateſt part of thoſe remaining in uſe having loſt their diminutive ſignification; but what diſtinguiſh the French moſt, are its juſtneſs, purity, accuracy, and flexibility.

French is the moſt univerſal and extenſive language in Europe. The policy of ſtates and courts has rendered it neceſſary for the miniſters of princes, and their officers, &c. and the taſte for arts and ſciences has had the ſame effect with regard to the learned. In Germany, and elſewhere, the princeſſes and perſons of diſtinction value themſelves on underſtanding French; and in ſeveral courts of Europe, French is almoſt as much known as the language of the country.

FRESCATI, or Frascati, a ſmall town, ſituated on the brow of a hill, about twelve miles to the eaſtward of Rome. It derives its name from the coolneſs of the air, and *freſh* verdure of the fields around. It is built on the ruins of the ancient Tuſculum; and the Tuſculan villa where Cicero wrote his famous queſtions is at a place now called *Grotta Ferrata*, about two miles diſtant. E. Long. 11. 43. N. Lat. 41. 48. There is a very fine proſpect from this town into the neighbouring country, which abounds with the ſeats of cardinals and other nobility. It is the ſee of a biſhop, who is one of the ſix ſenior cardinals, and is ſurrounded by ſome of the moſt beautiful villas in Italy; the principal of which are the villa Aldrobandini, belonging to prince Pamfili; the villa Taberna, belonging to prince Borgheſe; and villa Ludoviſi, to the family of Colonna. The villa Aldobrandini, called alſo *Belvedere* from its beautiful proſpect, is the moſt remarkable, on account of its fine ſituation, extenſive gardens, airy terraces, its grottos, caſcades, and waterworks. Over a ſaloon, near the grand caſcade, is the following inſcription:

Huc ego migravi muſis comitatus Apollo;
Hic Delphi, hic Helicon, hic mihi Delos erit.

The walls are adorned with a repreſentation of Apollo and the muſes, and ſome of that god's adventures are painted in freſco by Domenichino. The villa Taberna is one of the fineſt and beſt furniſhed of any in the neighbourhood of Rome. From this you aſcend thro' gardens to Monte Dracone, another palace on a more lofty ſituation, belonging alſo to that prince, and deriving its name from the arms of his family. From hence you may ſee Rome, and the whole extent of the plain: it has a noble aſcent, with a broad paved walk; and among other curioſities there is a hall adorned with the pictures of a vaſt number of eminent men for learning and arms. The gardens, laid out by Vignola, contain three miles in compaſs; and have many delightful walks, with curious water-works. Near this place are the monks of Camaldoli and the capuchins; and higher up are the ruins of the ancient Tuſculum. Aſcending towards the plain, two miles on the right-hand, you find the famous abbey of Grotta Ferrata, belonging to the monks of St Baſil, and ſituated on the ruins of Cicero's houſe. The virgin Mary of the great altar is an ancient Greek picture; in the chapel the pictures of St Nilus and St Bartholomew the abbot, are by Annibal Caracci; and all the paintings in freſco of this chapel are by Domenichino. Villa Ludoviſia has a charming walk going up to it, where you ſee the ruins of Lucullus's palace. The houſe is ſmall; but the gardens are large, embelliſhed with a great variety of walks and fountains, and a beautiful caſcade.

FRESCO, a method of painting in relievo on walls, ſo as to endure the weather. It is performed with water-colours on freſh plaſter, or on a wall laid with mortar not yet dry. This ſort of painting has a great advantage by its incorporating with the mortar, and drying along with it, becomes very durable. The Italians, from whom we borrow the term, call it *freſco*; becauſe it is frequently uſed for walls, alcoves, and other buildings in the *open air*. Vitruvius, lib. vii. cap. 4. calls it *udo tectorio*.

Painting in freſco is very ancient, having been practiſed in the earlieſt ages of Greece and Rome. It is chiefly performed on walls and vaults, newly plaſtered with lime and ſand; but the plaſter is only to be laid, in proportion as the painting goes on; no more being to be done at once than the painter can diſpatch in a day, while it dries. Before he begins to paint, a cartoon or deſign is uſually made on paper, to be calked, and transferred to the wall, about half an hour after the plaſter is applied.

The ancients painted on ſtucco; and we may remark in Vitruvius what infinite care they took in making the incruſtation or plaſtering of their buildings to render them beautiful and laſting; though the modern painters find a plaſter made of lime and ſand preferable to it; both as it does not dry ſo haſtily, and as being a little browniſh, it is fitter to lay colours on, than a ground ſo white as ſtucco.

In this kind of painting, all the compound and artificial colours, and almoſt all the minerals, are ſet aſide, and ſcarce any thing is uſed but earths; which are capable of preſerving their colour, defending it from the burning of the lime, and reſiſting its ſalt, which Vitruvius calls its bitterneſs.

For the work to come out in all its beauty, the colours muſt be laid on quick, while the plaſter is yet moiſt; nor ſhould they ever be retouched, dry, with colours mixed up with the white of an egg, or ſize, or gum, as ſome workmen do; becauſe ſuch colours grow blackiſh; nor do any preſerve themſelves, but only ſuch as were laid on haſtily at firſt.

The colours uſed are white made of lime ſlaked long before, and white marble duſt; ochre, both red and yellow; verditer; lapis lazuli; ſmalt; black chalk, &c. All which are only ground, and worked up with water; and moſt of them grow brighter and brighter as the freſco dries.

The bruſhes and pencils for this work ought to be long and ſoft, otherwiſe they will rake and raiſe the painting. The colours ſhould be full, and flowing from the bruſh; and the deſign perfect: for in this work you cannot alter or add upon any colour.

FRESH-WATER, is that not tinctured or impregnated with ſalt or ſaline particles, enough to be diſcoverable by the ſenſe. Such generally is that of ſprings, rains, wells, lakes, &c.

The dulcifying or making of ſalt water freſh is a ſecret that has been long ſought with great attention. For an account of the principal attempts that have been made with this view, ſee *SEA-WATER*.

FRESH Wind ſignifies ſtrong, but not violent; hence when the gale increaſes, it is ſaid to freſhen.

FRESHES, in ſea-language, denotes the impetuoſity of an ebb tide, increaſed by heavy rains, and flowing out into the ſea, often diſcolouring it a conſiderable diſtance, and forming a line that ſeparates the two colours, and which may be diſtinctly perceived for a great length along the coaſt.

FRESHES, a local term ſignifying annual inundations, from the rivers being ſwollen by the melted ſnows and other freſh waters from the uplands, as is the Nile, &c. from periodical or tropical rains. As a ſailor's term, it is oppoſed to marine or ſalt-water floodings, tides, &c. The word is of common uſe in America, where the inundations ſo called are of great ſervice. They bring down the ſoil to the intervals below, and form a fine mould, producing corn, grain, and herbage, in the moſt luxuriant plenty. They alſo afford another benefit, in regard to many rivers in America, *viz.* in equalizing the ſurface of the ſtream (where rapid falls, or caſcades, obſtruct the navigation), ſo that rafts of timber and other groſs produce are then floated down to the ſea-ports in great quantities.

FRESNOY (Charles Alphonſe du), an excellent poet and painter, was born at Paris in 1611. He was inſtructed there by Perrier and Simon Vouet in painting: but he did not long adhere to Vouet's manner of colouring; for as ſoon as he fixed himſelf at Rome, he made the works of Titian the models for his imitation. He was, however, more celebrated as a poet than as a painter; and gave more attention to the theory than to the practice of the pencil. Accordingly, he is better known by his incomparable poem *De arte graphica*, than by his performances on the canvas: and on this poem he beſtowed ſo much pains, that he died in 1665, before it was publiſhed. It was printed afterwards with a French proſe tranſlation and notes by M. de Piles; and was tranſlated into Engliſh by Mr Dryden, who prefixed to it an original preface containing a parallel between painting and poetry.

FRET, or FRETTE, in architecture, a kind of knot or ornament, conſiſting of two liſts or ſmall fillets variouſly interlaced or interwoven, and running at parallel diſtances equal to their breadth.

FRET, in heraldry, a bearing compoſed of ſix bars, croſſed and variouſly interlaced. Some call it the *true-lover's knot*. See HERALDRY.

FRET, in muſic, ſignifies a kind of ſtop on ſome inſtruments, particularly baſs-viols and lutes. Frets conſiſt of ſtrings tied round the neck of the inſtrument at certain diſtances, within which ſuch and ſuch notes are to be found.

Fret-Work, that adorned with frets. It is ſometimes uſed to fill up and enrich flat empty ſpaces; but it is moſtly practiſed in roofs, which are fretted over with plaſter work.

FRETTS, in mineralogy, a term uſed by miners to expreſs the worn ſide of the banks of the rivers in mine-countries, where they ſearch for the ſhoad ſtones or grewts waſhed down from the hills, in order from thence to trace out the running of the ſhoad up to the mine.

FRETTS, *Freats*, or *Freits*. See FREATS.

FRIABLE, among naturaliſts, an appellation given to bodies that are eaſily crumbled to pieces: ſuch are pumice and all calcined ſtones.

FRIAR, or FRIER, by the Latins called *frater*, the Italians *fra*, and the French *frere*, that is, *brother:* a term common to the monks of all orders; founded on this, that there is a kind of fraternity or brotherhood preſumed between the ſeveral religious perſons of the ſame convent or monaſtery.

Friars are generally diſtinguiſhed into theſe four principal branches, *viz.* 1. Minors, grey friars, or franciſcans. 2. Auguſtines. 3. Dominicans, or black friars. 4. White friars or carmelites. From theſe four the reſt of the orders deſcend. See FRANCISCANS, AUGUSTINES, &c.

FRIAR, in a more peculiar ſenſe, is reſtrained to ſuch monks as are not prieſts; for thoſe in orders are uſually dignified with the appellation of *father*.

Friars Obſervant (*fratres obſervantes*), were a branch of the Franciſcans; thus called, becauſe not combined together in any cloiſter, convent, or corporation, as the conventuals are; but only agreed among themſelves to obſerve the rules of their order, and that more ſtrictly than the conventuals did, from whom they ſeparated themſelves out of a ſingularity of zeal, living in certain places of their own chooſing.

FRIBURG, a large town of Germany, and capital of Briſgaw; remarkable for the ſteeple of the great church, which, next to that of Straſburg, is the fineſt in Germany; and for its univerſity. The inhabitants are famous for poliſhing cryſtal and precious ſtones. It has been ſeveral times taken and retaken; particularly by the French in 1744, who demoliſhed the fortifications. It is ſeated on the river Triſer, ten miles eaſt of Briſach, and 30 ſouth of Straſburgh. E. Long. 7. 57. N. Lat. 48. 4.

Cox's Travels in Switzerland, Vol. II. p. 166.

FRIBURG, a town of Swiſſerland, and capital of the canton of the ſame name, ſeated on the river Sane, in E. Long. 7. 5. N. Lat. 46. 50. Its ſituation is moſt ſingular and pictureſque: "It ſtands partly in a ſmall plain, partly on bold acclivities on a ridge of rugged rocks, half encircled by the river Sane; and is ſo entirely concealed by the circumjacent hills, that the traveller ſcarcely catches the ſmalleſt glimpſe, until he burſts upon a view of the whole town from the overhanging eminence. The fortifications, which conſiſt of high ſtone-walls and towers, incloſe a circumference of about four miles; within which ſpace the eye comprehends a ſingular mixture of houſes, rocks, thickets, and meadows, varying inſtantly from wild to agreeable, from the buſtle of a town to the ſolitude of the deepeſt retirement. The Sane winds in ſuch a ſerpentine manner as to form in its courſe, within the ſpace of two miles, five obtuſe angles, between which the intervening parts of the current are parallel to each other. On all ſides the deſcent to the town is extremely ſteep: in one place the ſtreets even paſs over the roofs of the houſes. Many of the edifices are raiſed in regular gradation like the ſeats of an amphitheatre; and many overhang the edge of a precipice in ſuch a manner, that on looking down, a weak head would be apt to turn giddy. But the moſt extraordinary point of view is from the Pont-neuf. To the north-weſt, part of the town ſtands boldly on the ſides and the piked back of an abrupt ridge; and from eaſt to weſt a ſemicircle of high perpendicular rocks is ſeen, whoſe baſe is waſhed and undermined by the winding Sane, and whoſe tops and ſides are thinly ſcattered with ſhrubs and underwood. On the higheſt point of the rocks, and on the very edge of the precipice, appears, half-hanging in the air, the gate of the town called *Bourgillon:* a ſtranger ſtanding on the bridge would compare it to Laputa, or the Flying Iſland in Guilliver's Travels: and would not conceive it to be acceſſible but by means of a cord and pulleys. The houſes, conſtructed with a grey ſand-ſtone, are neat and well built; and the public edifices, particularly the cathedral, are extremely elegant. The inhabitants are Roman Catholics, as are thoſe of the whole canton. The biſhop of Lauſanne, called here the biſhop of Friburg, reſides in this city. He is appointed by the pope, uſually at the recommendation of the French court; and his revenues, including a ſmall penſion from France, and from the abbey of Hauterive, of which he was abbot, amount to about L.400 *per annum*. His dioceſe extends over the whole canton, and part of that of Soleure. In all his acts and deeds he ſigns himſelf biſhop and count of Lauſanne, and prince of the German empire. The ſovereign power reſides in the great council of two hundred; compriſing the two advoyers, the chancellor, the grand ſautier, the ſenate or little council of twenty-four, the ſixty, from which body are choſen the bannerets and principal magiſtrates, and the remaining hundred and twelve members, who are ſimply denominated burghers."

FRIBURG (the canton of), and one of the 13 republics of Switzerland. It its ſurrounded on all ſides by the canton of Bern. The land is fertile in corn, fruits, and paſtures; and it is ſaid the canton can ſend 18,000 men into the field. This canton is entirely catholic.

FRICASSEE, a diſh or meſs haſtily dreſſed in a frying-pan, and ſeaſoned with butter, oil, or the like. The word is French, formed of the Latin *frixatura*, "frying." Others will have fricaſſee formed in imitation of the noiſe made by butter, or other fat, when melted in the pan. We ſay a fricaſſee of pullets, of rabbits, of tench, of tripe, of frogs, of eggs, of peas, &c.

FRICENTI, an epiſcopal town of Italy, in the kingdom of Naples, and in the farther principato, near the river Tripalto, in E. Long. 14. 13. N. Lat. 40. 59.

FRICTION, the act of rubbing or grating the ſurface of one body againſt that of another, called alſo *attrition*. The phenomena ariſing upon the friction of divers bodies, under different circumſtances, are very numerous and conſiderable. Mr Hawkſbee gives us a number of experiments of this kind; particularly of the attrition or friction of glaſs, under various circumſtances, the reſult of which was, that it yielded light and became electrical. All bodies by friction are brought to conceive heat; many of them to emit light; particularly a cat's back, ſugar, beaten ſulphur, mercury, ſea-water, gold, copper, &c. but above all, diamonds, which, when briſkly rubbed againſt glaſs, gold, or the like, yield a light equal to that of a live coal when blowed by the bellows. See Electrics and Electricity.

Friction, in mechanics, denotes the reſiſtance a moving body meets with from the ſurface on which it moves. Friction ariſes from the roughneſs or aſperity of the ſurface of the body moved on, and that of the body moving: for ſuch ſurfaces conſiſting alternately of eminences and cavities, either the eminences of the one muſt be raiſed over thoſe of the other, or they muſt be both broke and worn off; but neither can happen without motion, nor can motion be produced without a force impreſſed. Hence, the force applied to move the body is either wholly or partly ſpent on this effect; and conſequently there ariſes a reſiſtance or friction, which will be greater, *cæteris paribus*, as the eminences are the greater and the ſubſtance the harder: and as the body, by continual friction, becomes more and more poliſhed, the friction diminiſhes. See Mechanics.

Friction, in medicine and ſurgery, denotes the act of rubbing a diſeaſed part with oils, unguents, or other matters, in order to eaſe, relieve, and cure it. Frictions are much uſed of late in venereal caſes. They prefer the applying of mercury externally by way of friction, to that of giving it internally, to raiſe a ſalivation.

There are alſo frictions with the fleſh-bruſh, a linen cloth, or the hand only. Theſe frictions are a ſort of exerciſe which contributes greatly to health; as they excite and ſtir up the natural warmth, divert defluxions, promote perſpiration, open the pores of the ſkin, and carry off ſtagnant humours.

The fleſh-bruſh (Dr Cheyne obſerves) is an exerciſe extremely uſeful for promoting a full and free perſpiration and circulation. Every body knows the effect of currying horſes; that it makes them ſleek, gay, lively, and active; ſo as even to be judged equivalent to half the feeding. This it can no otherwiſe effect, but by aſſiſting nature to throw off the recrements of the juices, which ſtop the free circulation, and, by conſtant friction, irritation, and ſtimulation, to bring the blood and ſpirits to the parts moſt diſtant from the ſeat of heat and motion; and ſo plump up the ſuperficial muſcles. And the ſame effect it would have in other creatures, and man himſelf, if managed in the ſame manner, and with the ſame care and regularity. Perſons, therefore, of weak nerves and ſedentary lives, would do well to ſupply the want of other exerciſe with ſpending half an hour, morning and night, in currying and rubbing their whole body, eſpecially their limbs, with a fleſh-bruſh. But this means of health is moſt advantageouſly uſed when the *primæ viæ* are moſt empty.

FRIDAY, the ſixth day of the week; ſo named of *Freya*, a Saxon deity. By the Romans it was called *dies Veneris*. See Frea.

Good Friday. See *Good Friday*.

FRIDBURG, an imperial town of Germany, in Wetteravia. It is ſeated on a mountain, in E. Long. 8. 50. N. Lat. 50. 14. It was formerly much more conſiderable than at preſent.

FRIDSTOL, mentioned, in ancient writers, among the immunities granted to churches, ſignifies a ſeat, chair, or place of peace and ſecurity, where criminals might find ſafety and protection: of theſe there were many in England; but the moſt famous were that at Beverly, and that in St Peter's church at York, granted by charter of king Henry I.

FRIENDLY islands, a cluſter of iſlands in the Pacific Ocean, ſo named by Captain Cook in the year 1773, on account of the friendſhip which appeared to ſubſiſt among the inhabitants, and from their courteous behaviour to ſtrangers. Abel Janſen Taſman, an eminent Dutch navigator, firſt touched here in 1643, and gave names to the principal iſlands. Captain Cook laboriouſly explored the whole cluſter, which he found to conſiſt of more than 60. The three iſlands which Taſman ſaw he named *New Amſterdam*, *Rotterdam*, and *Middleburgh*. The firſt is the largeſt, and extends about 21 miles from eaſt to weſt, and about 13 from north to ſouth. Theſe iſlands are inhabited by a race of Indians, who cultivate the earth with great induſtry. The iſland of Amſterdam is interſected by ſtraight and pleaſant roads, with fruit-trees on each ſide, which provide ſhade from the ſcorching heat of the ſun. The chief iſlands are Annamooka, Tongataboo (the reſidence of the ſovereign and the chiefs), Lefooga, and Eooa. Lefooga is about 7 miles long, and in ſome places not above two or three broad. It is in many reſpects ſuperior to Annamooka. The plantations are both more numerous and more extenſive; and incloſed by fences which, running parallel to each other, form fine ſpacious public roads, which would appear beautiful in countries where rural conveniences have been carried to the greateſt perfection. They are, in general, highly cultivated, and well-ſtocked with the ſeveral roots and fruits which theſe iſlands produce; and Captain Cook endeavoured to add to their number by planting Indian corn, and the ſeeds of melons, pumpkins, and the like. Eooa, when viewed from the ſhip at anchor, formed one of the moſt beautiful proſpects in nature, and very different from the others of the Friendly Iſles; which being low and perfectly level, exhibit nothing to the eye but the trees which cover them: whereas here, the land riſing gently to a conſiderable height, preſents us with an extenſive proſpect, where groves of trees are only interſperſed at irregular diſtances, in beautiful diſorder, and all the reſt is covered with graſs, except near the ſhores, where it is entirely covered with fruit and other trees; amongſt which are the habitations of the natives. In order to have a view of as great a part of the iſland as poſſible, Captain Cook and ſome of his officers walked up to the higheſt point of the iſland. From this place they had a view of almoſt the whole iſland, which conſiſted of beautiful meadows of prodigious extent, adorned with tufts of trees, and intermixed with plantations. 'While I was ſurveying this delightful proſpect (ſays Captain Cook), I could not help flattering myſelf with the pleaſing idea that ſome future navigator may, from the ſame ſtation, behold theſe meadows ſtocked with cattle, brought to theſe iſlands by the ſhips of England; and that the completion of this ſingle benevolent purpoſe, independent of all other conſiderations, would ſufficiently mark to poſterity, that our voyages had not been uſeleſs to the general intereſts of humanity. 'The next morning,' ſays our benevolent commander, 'I planted a pine-apple, and ſowed the ſeeds of melons and other vegetables in Taoofa's plantation. I had indeed ſome encouragement to flatter myſelf that my endeavours of this kind alſo would not be fruitleſs; as I had this day a diſh of turnips ſerved up at my dinner, which was the produce of ſeeds I left here in my former voyage.'

The natives of theſe iſlands ſeldom exceed the common ſtature; but are very ſtrong and well made, eſpecially as to their limbs. They are generally broad about the ſhoulders; and though the muſcular diſpoſition of the men, which ſeems a conſequence of much action, rather conveys the appearance of ſtrength than of beauty, there are ſeveral to be ſeen who are really handſome. The women are not ſo much diſtinguiſhed from the men by their features as by their general form, which is for the moſt part deſtitute of that ſtrong fleſhy firmneſs that appears in the latter. Tho' the features of ſome are ſo delicate, as not only to be a true index of their ſex, but to lay claim to a conſiderable ſhare of beauty and expreſſion, for the bodies and limbs of moſt of the females are well proportioned; and ſome abſolutely perfect models of a beautiful figure. But the moſt remarkable diſtinction in the women, is the uncommon ſmallneſs and delicacy of their fingers, which may be put in competition with the fineſt in Europe. The general colour is a caſt deeper than the copper brown; but ſeveral of the men and women have a true olive complexion; and ſome of the laſt are even a great deal fairer. Their countenances very remarkably expreſs the abundant mildneſs or good-nature which they poſſeſs; and are entirely free from that ſavage keenneſs which marks nations in a barbarous ſtate. They are frank, cheerful, and good-natured.

There are, upon the whole, few natural defects or deformities to be found amongſt theſe people. The moſt common is the tetter or ring-worm, that ſeems to affect almoſt one half of them, and leaves whitiſh ſerpentine marks every where behind it; but this is of leſs conſequence than another which is very frequent, and appears on every part of the body. Captain Cook had the mortification to learn that all the care he took, when he firſt viſited theſe iſlands, to prevent the venereal diſeaſe from being communicated to the inhabitants, had proved ineffectual. What is extraordinary, they do not ſeem to regard it much; and as there appeared few ſigns of its deſtroying effects, probably the climate, and the way of living of theſe people, greatly abate its virulence. There are two other complaints frequent amongſt them; one of which is an indolent firm ſwelling, that affects the legs and arms, and increaſes them to an extraordinary ſize in their whole length. The other is a tumor of the ſame ſort in the teſticles, which ſometimes exceeds the ſize of the two fiſts. But in other reſpects they may be conſidered as uncommonly healthy.

Their hair is in general ſtraight, thick, and ſtrong, though a few have it buſhy or frizzled. The natural colour is black; but the greateſt part of the men, and ſome of the women, have it ſtained of a brown or purple colour, and a few of an orange caſt. They wear it variouſly cut. Some have it cut off on one ſide of the head only; others have it entirely cut off except a ſingle lock; the women in general wear it ſhort. The men have their beards cut ſhort; and both men and women ſtrip the hair from the arm-pits. The men are ſtained from about the middle of the belly to about half way down the thighs with a deep blue colour. The women have only a few ſmall lines or ſpots thus imprinted on the inſide of their hands. Their kings, as a mark of diſtinction, are exempted from this cuſtom.

The men are all circumciſed, or rather ſuperciſed, as the operation conſiſts in cutting off only a ſmall piece of the foreſkin at the upper part; which by that means is rendered incapable ever after of covering the glans. This is all they aim at, as they ſay the operation is practiſed from a notion of cleanlineſs.

The dreſs of both men and women are the ſame; and conſiſts of a piece of cloth or matting (but moſtly the former) about two yards wide and two and a half long; at leaſt ſo long as to go once and a half round the waiſt, to which it is confined by a girdle or cord. It is double before, and hangs down like a petticoat, as low as the middle of the leg. The upper part of the garment above the girdle is plaited into ſeveral folds; ſo that, when unfolded, there is cloth ſufficient to draw up and wrap round the ſhoulders; which is very ſeldom done. The inferior ſort are ſatisfied with ſmall pieces; and very often wear nothing but a covering made of leaves of plants, or the maro, which is a narrow piece of cloth or matting like a ſaſh. This they paſs between the thighs and wrap round the waiſt; but the uſe of it is chiefly confined to the men. The ornaments worn by both ſexes are necklaces, made of the fruits of the pandanus, and various ſweet-ſmelling flowers, which go under the general name of *kahulla*. Others are compoſed of ſmall ſhells, the wing and leg bones of birds, ſhark's teeth, and other things; all which hang looſe upon the breaſt; rings of tortoiſe ſhells on the fingers; and a number of theſe joined together as bracelets on the wriſts. The lobes of the ears (though moſt frequently only one) are ſometimes perforated with two holes, in which they wear cylindrical bits of ivory about three inches long.

Cleanlineſs induces them to bathe in the ponds, which ſeem to ſerve for no other purpoſe. They are ſenſible that ſalt water hurts their ſkin; and when neceſſity obliges them to bathe in the ſea, they commonly have ſome cocoa-nut ſhells filled with freſh water poured over them to waſh it off. People of ſuperior rank uſe cocoa-nut oil, which improves the appearance of the ſkin very much.

The employment of the women is of the eaſy kind, and, for the moſt part, ſuch as may be executed in the houſe. The manufacturing their cloth is wholly conſigned to their care; as is alſo that of their mats, which are eſteemed both for their texture and their beauty. There are many other articles of leſs note that employ the ſpare time of their females; as combs, of which they make vaſt numbers, and little baſkets with ſmall beads; but all finiſhed with ſuch neatneſs and taſte in the diſpoſition of the various parts, that a ſtranger cannot help admiring their aſſiduity and dexterity.

The province allotted to the men, as might be expected, is far more laborious and extenſive than that of the women. Agriculture, architecture, boat-building, fiſhing, and other things that relate to navigation, are the objects of their care. Cultivated roots and fruits being their principal ſupport, this requires their conſtant attention to agriculture, which they purſue very diligently, and ſeem to have brought almoſt to as great perfection as circumſtances will permit. In planting the plantains and yams, they obſerve ſo much exactneſs, that, which ever way you look, the rows preſent themſelves regular and complete. The cocoa-nut and bread-fruit trees are ſcattered about without any order, and ſeem to give them no trouble after they have attained a certain height.

The houſes of the lower people are poor huts, and very ſmall; thoſe of the better ſort are larger and more comfortable. The dimenſions of one of a middling ſize are about 30 feet long, 20 broad, and 12 high. Their houſe is, properly ſpeaking, a thatched roof or ſhed, ſupported by poſts and rafters, diſpoſed in a very judicious manner. The floor is raiſed with earth ſmoothed, and covered with ſtrong thick matting, and kept very clean. A thick ſtrong mat, about two and a half or three feet broad, bent into the form of a ſemicircle, and ſet upon its edge, with the ends touching the ſide of the houſe, in ſhape reſembling the fender of a fire hearth, incloſes a place for the maſter and miſtreſs of the family to ſleep in. The reſt of the family ſleep upon the floor, wherever they pleaſe to lie down; the unmarried men and women apart from each other: Or if the family be large, there are ſmall huts adjoining, to which the ſervants retire in the night; ſo that privacy is as much obſerved here as one could expect. The clothes that they wear in the day ſerve for their covering in the night. Their whole furniture conſiſts of a bowl or two, in which they make kava; a few gourds; cocoa-nut ſhells; and ſome ſmall wooden ſtools, which ſerve them for pillows.

They diſplay much ingenuity in the building of their canoes, as well as in the navigating them.

The only tools which they uſe to conſtruct them, which are very dexterouſly made, are hatchets, or rather thick adzes, of a ſmooth black ſtone that abounds at Toofoa; augres, made of ſhark's teeth, fixed on ſmall handles, and raſps of a rough ſkin of a fiſh, faſtened on flat pieces of wood, thinner on one ſide, which alſo have handles. The cordage is made from the fibres of the cocoa-nut huſk, which, though not more than nine or ten inches long, they plait, about the ſize of a quill, or leſs, to any length that they pleaſe, and roll it up in balls, from which the larger ropes are made by twiſting ſeveral of theſe together. The lines that they fiſh with are as ſtrong and even as the beſt cord we make, reſembling it almoſt in every reſpect. Their other fiſhing implements are large and ſmall hooks made of pearl-ſhell. Their weapons are clubs of different ſorts (in the ornamenting of which they ſpend much time), ſpears, and darts. They have alſo bows and arrows; but theſe ſeemed to be deſigned only for amuſement, ſuch as ſhooting at birds, and not for military purpoſes. The ſtools are about two feet long, but only four or five inches high, and near four broad, bending downward in the middle, with four ſtrong legs, and circular feet; the whole made of one piece of black or brown wood, neatly poliſhed, and ſometimes inlaid with bits of ivory.

Yams, plantains, and cocoa-nuts, compoſe the greateſt part of their vegetable diet. Of their animal food, the chief articles are, hogs, fowls, fiſh, and all ſorts of ſhell fiſh; but the lower people eat rats. The two firſt vegetable articles, with bread-fruit, are what may be called the baſis of their food, at different times of the year, with fiſh and ſhell-fiſh; for hogs, fowls, and turtle, ſeem only to be occaſional dainties, reſerved for their chiefs. Their food is generally dreſſed by baking, and they have the art of making, from different kinds of fruit, ſeveral diſhes which moſt of us eſteemed very good. The generality of them lay their victuals upon the firſt leaf they meet with, however dirty it may be; but when food is ſerved up to their chiefs, it is commonly laid upon green plantain leaves. The women are not excluded from eating with the men; but there are certain ranks or orders amongſt them that can neither eat nor drink together. This diſtinction begins with the king; but where it ends could not be learnt. They ſeem to have no ſet time for meals. They go to bed as ſoon as it is dark, and riſe with the dawn in the morning.

Their private diverſions are chiefly ſinging, dancing, and muſic, performed by the women. The dancing of the men has a thouſand different motions with the hands, to which we are entire ſtrangers; and they are performed with an eaſe and grace which are not to be deſcribed but by thoſe who have ſeen them.

Whether their marriages be made laſting by any kind of ſolemn contract, our voyagers could not determine with preciſion; but it appeared that the bulk of the people ſatisfied themſelves with one wife. The chiefs, however, have commonly ſeveral women; tho' it appeared as if one only was looked upon as the miſtreſs of the family.

When any perſon of conſequence dies, his body is waſhed and decorated by ſome woman or women, who are appointed on the occaſion; and theſe women are not, by their cuſtoms, to touch any food with their hands for many months afterwards; and it is remarkable, that the length of the time they are thus proſcribed, is the greater in proportion to the rank of the chief they had waſhed.

The concern of theſe people for the dead is moſt extraordinary. They beat their teeth with ſtones. ſtrike a ſhark's tooth into the head until the blood flows in ſtreams, and thruſt ſpears into the inner part of the thigh, into their ſides below the arm-pits, and through the cheeks into the mouth. All theſe operations convey an idea of ſuch rigorous diſcipline, as muſt require either an uncommon degree of affection, or the groſſeſt ſuperſtition to exact. It ſhould be obſerved, however, that the more painful operations are only practiſed on account of the death of thoſe moſt nearly connected.

Their long and general mourning proves, that they conſider death as a very great evil. And this is confirmed by a very odd cuſtom which they practice to avert it. They ſuppoſe that the Deity will accept of the little finger, as a ſort of ſacrifice efficacious enough to procure the recovery of their health. They cut it off with one of their ſtone hatchets. There appeared ſcarcely one in ten of them who was not thus mutilated in one or both hands. According to Captain King, it is common alſo for the inferior people to cut off a joint of their little finger on account of the ſickneſs of the chiefs to whom they belong.

They ſeem to have little conception of future puniſhment. They believe, however, that they are juſtly puniſhed upon earth; and conſequently uſe every method to render their divinities propitious. The ſupreme Author of all things they call *Kallafootonga*; who, they ſay, is a female reſiding in the ſky, and directing the thunder, wind, rain, and in general all the changes of weather. They believe that when ſhe is angry with them, the productions of the earth are blaſted; that many things are deſtroyed by lightning; and that they themſelves are afflicted with ſickneſs and death as well as their hogs and other animals. When this anger abates, they ſuppoſe that every thing is reſtored to its natural order. They alſo admit a plurality of deities, though all inferior to *Kallafootonga*. They have leſs abſurd ſentiments about the immateriality and the immortality of the ſoul. They call it *life*, the living principle; or what is more agreeable to their notions of it, *Otooa*; that is, a divinity or inviſible being.

Of the nature of their government no more is known than the general outline. According to the information received, the power of the king is unlimited, and the life and property of the ſubject are at his diſpoſal; and inſtances enough were ſeen to prove that the lower order of people have no property, nor ſafety for their perſons, but at the will of the chiefs to whom they reſpectively belong. When any one wants to ſpeak with the king or chief, he advances and ſits down before him with his legs acroſs; which is a poſture to which they are ſo much accuſtomed, that any other mode of ſitting is diſagreeable to them. To ſpeak to the king ſtanding would be accounted here as a ſtriking mark of rudeneſs.

Though ſome of the more potent chiefs may vie with the king in point of actual poſſeſſions, they fall very ſhort in rank and in certain marks of reſpect, which the collective body have agreed to pay the monarch. It is a particular privilege annexed to his ſovereignty, not to be punctured nor circumciſed, as all his ſubjects are. Whenever he walks out, every one whom he meets muſt ſit down till he has paſſed. No one is allowed to be over his head; on the contrary all muſt come under his feet; for there cannot be a greater outward mark of ſubmiſſion than that which is paid to the ſovereign and other great people of theſe iſlands by their inferiors. The method is this; the perſon who is to pay obeiſance ſquats down before the chief, and bows the head to the ſole of his foot: which, when he ſits, is ſo placed that it cannot eaſily be come at, and having tapped or touched it with the under and upper ſide of the fingers of both hands, he riſes up and retires. The hands, after this application of them to the chief's feet, are in ſome caſes rendered uſeleſs for a time: for until they be waſhed, they muſt not touch any kind of food. When the hands are in this ſtate, they call it *taboo rema*. *Taboo*, in general, ſignifies "forbidden," and *rema* is their word for "hand." Their great men are fond of a ſingular piece of luxury; which is, to have women ſit beſide them all night, and beat on different parts of their body until they go to ſleep; after which they relax a little of their labour, unleſs they appear likely to awake; in which caſe they redouble their drumming until they are again faſt aſleep.

1
Definition of friendſhip.

FRIENDSHIP may be defined, a mutual attachment ſubſiſting between two perſons; and ariſing not merely from the general principle of benevolence, from emotions of gratitude for favours received, from views of intereſt, nor from inſtinctive affection or animal paſſion, but from an opinion entertained by each of them that the other is adorned with ſome amiable or reſpectable qualities.

2
Illuſtration of the above definition.

The object of the general principle of benevolence is *mankind*, not any particular individual. Gratitude regards the perſon from whom he who feels its emotions has received a favour, whether that perſon be a virtuous or a vicious, a reſpectable or a contemptible, character: it prompts the perſon obliged to make a ſuitable return to his benefactor, but not to enter into any particular intimacy with him, merely on account of the favours which he has received. Many connections are formed, and dignified with the name of *friendſhip*, upon no other principle but the ſordid hope which one or perhaps each of the parties entertains of accompliſhing ſome ſelfiſh purpoſe through the aſſiſtance of the other; but ſuch a connection is ſo baſe in its nature, and ſo tranſitory in its duration, as to render it unneceſſary for us to ſpend time in demonſtrating it to be unworthy of the name of friendſhip. The inſtinctive affection which a parent entertains for his child, as well as that which the child feels for his parent, ſeem intended by nature to form an union between the perſons thus related to each other: but the union between parents and children, when ſupported by no other principle but inſtinct, is different from friendſhip; it extends no farther than to cauſe the parent to provide for his child during his helpleſs years, and the child to look up to his parent for protection and ſupport. We need not mention that appetite which is the foundation of love, and is the proviſion which nature has made for the continuation of our ſpecies. This appetite alone, and unaſſiſted by ſome nobler principle, cannot give riſe to any connection worthy of an honourable name.

After excluding theſe principles, we can refer the origin of friendſhip only to "an opinion entertained by each of the parties between whom it ſubſiſts, that the other is adorned with ſome amiable or reſpectable qualities." A connection founded on different principles we cannot honour with the names of friendſhip; but that which flows from that pure ſource muſt be noble and virtuous. When two perſons of virtue and abilities contemplate each the other's character and conduct, they cannot but view them with complacency and eſteem. Habits and actions diſplaying prudence, fortitude, moderation, integrity, benevolence, and piety naturally command the approbation of the impartial ſpectator, and even affect him with delight. But as we are diſpoſed to reviſit a landſcape, the beauties of which we have contemplated with rapture, and read with frequent delight a poem in which genius has faithfully delineated ſome of the moſt enchanting ſcenes or the moſt intereſting events in nature; ſo we alſo become deſirous to enjoy frequent opportunities of contemplating a character diſtinguiſhed for eminent abilities and illuſtrious virtues. The ſociety of ſuch a perſon is preferred to his who is diſgraced by the oppoſite qualities. Hence, whenever men of truly reaſectable characters enjoy opportunities of mutual intercourſe, an attachment naturally takes place between them; entirely diſintereſted, and founded ſolely on the approbation with which the one cannot avoid regarding the conduct of the other. The eſteem which the one is thus induced to entertain for the other will lead them to ſeek frequent opportunities of enjoying each other's ſociety, mutually to aſk and liſten to advice, to truſt their moſt ſecret and important purpoſes to each other's confidence, and to be no leſs concerned each of them for the other's intereſt and honour than for his own. This, and this alone, is genuine friendſhip, founded on virtue, and on that approbation which virtue never fails to command; it is a natural conſequence of intercourſe between virtuous men. Where it is once eſtabliſhed, it cannot die while thoſe virtues to which it owes its origin continue to adorn the perſons between whom it ſubſiſts.

3
Circumſtances favourable to the riſe and continuance of friendſhip.

But, perhaps, ſuch a pure and ſublime attachment can ſcarce be expected to exiſt among beings of ſo mixed and imperfect a charcter as mankind. The wiſe man of the ancient Stoics, or the Chriſtian who faithfully obeys the precepts and follows the ſteps of his Saviour, might be capable of it; but, unfortunately, humanity never reaches ſuch perfection. Virtue and vice are ſo blended together in every human character, that while none is ſo worthleſs as to excite no other ſentiment but abhorrence, there is ſcarce any ſo uniformly virtuous as to command unvaried eſteem or admiration. Even the pureſt and moſt diſintereſted of thoſe friendſhips which prevail among men, owe their origin to other meaner principles, as well as to that which has been mentioned as the principle of genuine friendſhip. There are certain circumſtances favourable, and others adverſe, to the formation and continuance of friendſhip. Theſe making amends as it were, for the imperfection of human virtue and human knowledge, lead men to overlook each others faults and follies, and to unite in the bonds of friendſhip; a friendſhip which though leſs ſolid, leſs generous, and leſs laſting, than that which we have above deſcribed, is yet attended with effects favourable to the happineſs of individuals, and to the intereſts of ſociety in general.

Equality of age is favourable to friendſhip. Infancy, manhood, and old age differ ſo conſiderably from each other, in their views, paſſions, and purſuits, that the *man* will ſeldom be diſpoſed to aſſociate with the *boy* or the *youth*, in preference to one who has had equal experience in the world with himſelf; and the *old man* will generally wiſh for the company of ſome ancient friend with whom he may ſpeak of the days of former years."

They who alſo cultivate the *ſame trade or profeſſion*, enjoy opportunities favourable to the formation of friendſhip. Being engaged among the ſame objects, and acquiring ſkill in the ſame arts, their knowledge, their ſentiments, and habits, are nearly the ſame; they cannot avoid frequent intercourſe with each other; they naturally enter into each other's prejudices and views, and therefore cannot but take pleaſure in each other's converſation and ſociety. Phyſicians, lawyers, and divines, form each of them a diſtinct body; and the members of each of theſe bodies aſſociate with one another more readily than with men of a different profeſſion. It is related by Swift or Addiſon, that, in the beginning of the preſent century, there was a particular coffee-houſe in London which clergymen uſed to frequent, and that a ſon of the church ſcarce ever ventured to ſhow his head in any other. In the days of Dryden, poets, and all who pretended to poetical genius or taſte, reſorted to *Will's* as to another Parnaſſus, to ſip cups of coffee, and now and then perhaps to drink of ſome more inſpiring liquor, inſtead of the waters of the fountain Hippocrene.

Equality of rank and fortune is alſo favourable to friendſhip. Seldom will a man of fortune be able to gain the ſincere friendſhip of any of his dependants. Though he treat them with the moſt obliging condeſcenſion, and load them with favours; yet ſtill, either the ſenſe of dependence, or reſentment for imaginary injuries, or impatience of the debt of gratitude, or ſome other ſimilar reaſon, will be likely to prevent them from regarding him with cordial affection. Servants are but rarely faithful even to the moſt indulgent maſter; Shakeſpeare's old Adam is a very amiable but a very uncommon character. Indeed you may as ſoon expect to find the virtues and the generous courage of the chevalier Bayard among our military men of the preſent age, as to find an old Adam among the preſent race of ſervants. It is no leſs vain for the poor man to hope to acquire a ſincere friend among his ſuperiors in rank and fortune. The ſuperior is generally diſpoſed to exact ſuch profound deference, ſuch gratitude, ſuch reſpect, even from the inferior whom he admits into his intimacy, that the equal amicable intercourſe of friendſhip can ſcarce ever take place between them. Among the letters of the younger Pliny, we are pleaſed to find many monuments of the goodneſs of his heart. A number of his epiſtles addreſſed to friends in meaner circumſtances, appear to have been accompanied with very conſiderable preſents, which by his opulence he was well enabled to beſtow. But he takes care to let thoſe humble friends know the weight of the obligations which he conferred, and the vaſtneſs of the debt of gratitude which they owed to him, in ſuch plain, nay even indelicate terms, that though they might receive his favours with gratitude and regard him as their benefactor, yet they could never regard him as a man with whom they might cultivate the free eaſy intercourſe of friendſhip. Some one or other of Greek writers mentions a ſingular inſtance of cordial friendſhip ſubſiſting between two perſons in unequal circumſtances. One of them dying before the other, and leaving a wife and daughter to whom he had no fortune nor even means of ſubſiſtence to bequeath, enjoined his rich friend, in his will, to take the charge of them on himſelf, and to ſupport them in a liberal manner; nor did he intreat this from his humanity, but demanded it from his friendſhip. He had made a ſure proviſion for his family. His rich friend delayed not to comply with his dying injunction. He readily took upon himſelf the charge of the wife and daughter of his deceaſed friend, treated them with kindneſs, and at laſt divided his whole fortune equally between his own only daughter and the child of his friend. This is an agreeable inſtance of the power of friendſhip: but ſuch inſtances are not to be expected to occur frequently in ordinary life, any more than the ſtoic virtue of Cato, or the modeſt piety of a Nelſon.

Similarity of taſte and temper will generally be found favourable to friendſhip. Two peeviſh men, indeed, will not long endure each other's company with much ſatisfaction; but two perſons of mild humane diſpoſitions will naturally take delight in each other's ſociety and converſation. They who are charmed with the buſtle of a gay and active life, avoid the haunts of the indolent and contemplative, and join hand in hand to climb the heights of ambition, or tread the round of amuſement and diſſipation. Thoſe whom taſte leads to cultivate the elegant objects of literature amid the ſweets of a rural retirement, to wander thro' the grove, or recline on the brink of ſome romantic rill, and peruſe the pages of one of thoſe geniuſes who have ſhown themſelves able to enlighten the underſtanding, and to kindle the glow of generous ſentiment in the breaſt:—thoſe children of taſte frequently aſſociate in their elegant purſuits. We are pleaſed to read the correſpondence of Pliny and Tacitus, of Locke and Molineux, of Swift and Pope. We rejoice to find, that notwithſtanding the rivalry of learning and genius, taſte and philoſophy have a natural tendency to promote benevolence and friendſhip among their votaries. The buſtle of the world muſt be acknowledged to be generally unfavourable to friendſhip. When the heart is occupied with the ſordid objects of ambition, or avarice, or gay diſſipation, there is no room left for the pure and generous ſentiments of friendſhip. Intereſts often interfere, competitions and jealouſies ariſe, fatal to all the ſweets of ſocial intercourſe. It is in an active life that virtue ſhines with the moſt brilliant luſtre; but ſeldom, alas! does pure virtue appear in the ſcenes of active life. How beautifully does the character of Atticus ſhine amid the characters of his illuſtrious cotemporaries! *ut Luna inter minores ignes!* Sylla, Cæſar, Cicero, Brutus, Antony, and Auguſtus, were eminent for their abilities and virtues; but being engaged in the buſtling purſuits of ambition, they ſeem to have been ſtrangers to the calm and elegant happineſs which Atticus enjoyed. Though thoſe of them who were cotemporaries could not avoid perceiving and admiring each other's merits, yet never did cordial friendſhip ſubſiſt between them. Even Cicero who could ſo well define the duties and deſcribe the happineſs of friendſhip, yet appears to have but ſeldom enjoyed its delights. But Atticus, who conſtantly declined entering the ſcenes of public life, experienced ſuch happineſs in a private condition, as muſt have been more than an ample reward to him for ſhunning all the ſplendid purſuits of ambition. He was the diſintereſted friend of all thoſe eminent men, and enjoyed their eſteem and friendſhip. So upright was his character, ſo amiable his manners, that they who were mortal enemies to each other, yet agreed in cultivating at the ſame time the friendſhip of Atticus. None of them appear to have hated him on account of his attachment to their enemies: and while he was the friend of Cicero and Octavius, he was at the ſame time the protector of the wife of Antony. Perhaps the virtue of ſuch a character may be regarded as problematical. It may be alleged, that while ſuch inveterate diſſenſions aroſe among his friends, the neutrality which he preſerved was inconſiſtent with integrity. He has indeed been raſhly branded by ſome writers as an avaricious time-ſerving man. But no evidence appears to juſtify their aſſertions; on the contrary, the moſt reſpectable teſtimony, the niceſt ſcrutiny, exhibit his character in thoſe amiable colours in which we have choſen to view it. Atticus is indeed no ordinary character. The general principles of human nature, and the examples which moſt frequently occur in the world, naturally ſuggeſt a ſuſpicion, that had he been a man of genuine integrity, he muſt have obſerved a different tenor of conduct. But there is one circumſtance which tends to ſtrengthen conſiderably the reſpectable teſtimony of his cotemporaries in his behalf. In Cato, in Epictetus, in the philoſopher who, while ſuffering under all the violence of an acute diſtemper, maintained to Pompey that pain was no evil, we have inſtances of the tenets of philoſophy oppoſing and repreſſing the principles of nature. We know how often religious enthuſiaſm has produced the ſame effects. But Atticus was the votary of the mild and elegant philoſophy of Epicurus; which, though there appears to have been a palpable inconſiſtency between its principles and the ſuperſtructure raiſed upon them, was yet in its general tendency not unfriendly to virtue, and recommended to its votaries that calm and innocent mode of life which Atticus cultivated. There is no ſmall reſemblance between the character of Atticus and that of Epicurus, the founder of this philoſophy. The ſame tenets ſeem to have produced the ſame effects on both; and we will venture to pronounce ſo high an encomium on the Epicurean philoſophy, as to aſſert, that it chiefly contributed to form the character of this amiable Roman.

3 Sex. We know not if we may venture to affirm, that friendſhips are moſt naturally contracted among perſons of the ſame ſex. We believe they often are. If ſimilarity of taſte, of ſentiments, of manners, be favourable to friendſhip, this cannot but happen. The diſtinction which nature has eſtabliſhed between the two ſexes, the new diſtinctions which are introduced by the different views with which their education is conducted, and the different duties which they are called to perform in life, have all a tendency to diſpoſe men and women to enter into habits of intimacy with perſons of their own ſex rather than with the other. Young girls have their peculiar amuſements, as boys have theirs; they knit and ſew together, conſult each other concerning their dreſs, and aſſociate at their idle hours. Young men, in the ſame manner, prefer the ſociety of their equals of the ſame ſex till ſuch times as their hearts begin to feel the impulſe of a new paſſion. This ſoft paſſion, indeed, cauſes the youth to prefer the company of his favourite maid to that of his deareſt companion; and it perhaps cauſes the virgin to view her female companions with a jealous eye, while ſhe fears that their charms may win the heart of the youth whoſe fond regard ſhe herſelf wiſhes to engage. But the fears, the jealouſies, the timidity, nay even the fondneſs of love, are incompatible with friendſhip. Though the lover and his miſtreſs be dear to each other, yet the free confidence of

friendſhip cannot take place between them. They dare not yet venture to truſt to each other all the ſecrets of their hearts. But if their mutual wiſhes be crowned by marriage; then, indeed, as their intereſts become the ſame, if the tranſports of love are not ſucceeded by the calm delights and the free confidence of friendſhip, they muſt be unhappy. The marriage ſtate is peculiarly favourable to friendſhip. Perſons whoſe relations to each other are more remote, will often find circumſtances concurring to induce them to cultivate a friendly intercourſe with each other. But here indifference is almoſt impoſſible. It is abſolutely requiſite, in order that they may not render each other miſerable, that the huſband and the wife be united in the bonds of friendſhip. This ſeems even to be one of the great laws of nature, by means of which proviſion is made for the happineſs and the preſervation of ſociety. But though the wife and the huſband be particularly attached to each other by the ties of friendſhip no leſs than by thoſe of love, yet their mutual affection will not detach them from the reſt of the world; their relations to the ſociety around them will ſtill remain; the huſband will ſtill cultivate the intimacy of thoſe of his own ſex, and the wife will ſtill chooſe female in preference to male friends. Upon even a ſuperficial view of life, we find reaſon to declare without heſitation, that acquaintance and intimacy moſt naturally take place among perſons of the ſame ſex. The huſband and the wife are more than friends; they are *one bone and one fleſh*. It has been ſometimes ſlightly inſinuated, and ſometimes more openly aſſerted, by people who have but careleſsly viewed the phenomena of ſocial life, or have been diſpoſed to cavil againſt the fair ſex, that women are incapable of ſincerity or conſtancy in friendſhip with each other. But it ſeems unneceſſary to offer a ſerious refutation of this cavil. Neither is the general character of the female ſex ſo inferior to that of the male, nor are their circumſtances ſo very different from ours as to render them totally incapable of thoſe virtues which are neceſſary to eſtabliſh and ſupport mutual friendſhip. They are in general poſſeſſed of more exquiſite ſenſibility, nicer delicacy of taſte, and a juſter ſenſe of propriety, than we: nor are they deſtitute of generoſity, fidelity, and firmneſs. But ſuch qualities are peculiarly favourable to friendſhip: they communicate a certain charm to the manners of the perſon who is adorned with them; they render the heart ſuſceptible of generous diſintereſted attachment; and they elevate the ſoul above levity, inſincerity, and meanneſs. Competitions and jealouſies muſt no doubt ariſe now and then even among the moſt amiable of the female ſex, as well as among us. Theſe will preclude or deſtroy friendſhip. But the rivalry of beauty, of dreſs, of faſhion, is not oftener fatal to friendſhip among the fair ſex, than the conteſts of pride, avarice, vanity, and ambition, among their haughty lords. If friendſhip be ranked among the virtues, it is not leſs a female than a male virtue.

5
Relations of conſanguinity.

The delightful intercourſe and intimacy of friendſhip may be naturally expected to ſubſiſt not only between the huſband and the wife, but among all who are connected by any of the relations of conſanguinity. The power of inſtinct does not always continue to unite the parent and the child. Its offices are of a temporary nature; but when theſe are performed, it ceaſes to operate. During the infancy, the childhood, and even the youth, of his ſon or daughter, the parent watches over them with fond affection, and labours with anxious aſſiduity to promote their welfare, for no other reaſon but becauſe the yearnings of paternal affection draw him towards them. But as they advance farther in life, and become able to care for themſelves, it has been ſo ordered by the wiſdom of nature, that the attachment of the parent almoſt dies away, unleſs the grateful affection and the merit of his children afford him reaſon to rejoice over them and bleſs them. How ſhocking, how miſerable, the condition of that family, whoſe members are not united by the mutual eſteem and confidence of friendſhip! where the parent views his children with jealouſy, ſhame, indignation, or ſorrow; and the children anxiouſly avoid the ſociety of their parents! Their intereſts are ſo nearly connected; they have ſo many occaſions for acting in concert, and muſt live ſo long together; that we may almoſt venture to affirm, that the parent and the child, like the huſband and the wife, muſt be either friends or enemies. But the ties of nature, the influence of habit, ſentiments, and circumſtances, all concur to form between them the ſacred connection of friendſhip. Brothers and ſiſters, the children of the ſame parents, and for a while members of the ſame family, may be expected to regard each other through life with kindneſs and eſteem; and theſe we would rather chooſe to attribute to a rational attachment, founded on certain principles, than to a blind inſtinctive affection.

Theſe are a few of the diſtinctions and relations in ſociety which appear moſt favourable to friendſhip.—Were we to deſcend to minuter particulars, we might enumerate all the varieties of taſte, of temper, and of circumſtances, by which mankind are diſtinguiſhed from one another, and diſtributed into particular claſſes. But this would be too tedious, and does not appear neceſſary.

6
Laws of friendſhip.

As friendſhip is an attachment which takes place between certain human characters when placed in certain circumſtances, there muſt therefore be laws for ſupporting the attachment and regulating the intercourſe of friendſhip. Mutual eſteem is the baſis on which true friendſhip is eſtabliſhed; and the intercourſe of friendſhip ought ſurely to be connected in ſuch a manner that this foundation be not injured. Friendſhip muſt diminiſh neither our benevolence nor prudence: it muſt not ſeduce us from an honeſt attention to our private intereſt, nor contract our ſocial affections.

Sincerity may be conſidered as the firſt law of friendſhip. Artifice and hypocriſy are inimical to all ſocial intercourſe. Between the deceitful and the honeſt, friendſhip can never ſubſiſt. For a while, the one may impoſe on the other; unſuſpicious integrity may not be able to ſee through the maſk under which the hideous features of ſelfiſh cunning are veiled; but the deceitful friend muſt ever be a ſtranger to the delightful ſentiments of genuine friendſhip. To enjoy theſe, your virtues muſt be ſincere, your affection for the perſon whom you call your friend unfeigned: in communicating to each other your ſentiments, in offering and liſtening to mutual advice, in joining to proſecute the ſame deſigns, or ſhare in the ſame amuſements, candid ſincerity muſt ſtill be obſerved between you. Attempt not to perſuade each other, that your mutual affection is more ardent, or your mutual eſteem more profound, than it really is. If the ſentiments or opinions which the one expreſſes appear to the other improper or ill founded, let not a falſe delicacy prevent him from declaring his reaſons againſt them; let him not applaud where, if he were ſincere, he muſt blame. Join not even your friend in an undertaking which you ſecretly diſlike, or an amuſement inſufferably diſagreeable to you. You cannot, conſiſtently with ſincerity and candour: and you will ſoon begin to think the bleſſings of friendſhip too dear, when bought at the price of ſuch ſacrifices.

But though ſincerity is to be faithfully obſerved in the intercourſe of friendſhip; yet the harſhneſs of contradiction muſt be carefully avoided. Thoſe obliging manners which are ſo agreeable in an acquaintance or caſual companion, are ſtill more ſo in a friend. If they are neceſſary to recommend the advantages of ſocial intercourſe in general to the members ſociety, they are no leſs neceſſary to communicate a charm to the intercourſe of friendſhip. People often think themſelves intitled to behave to thoſe whom they call their friends, and whoſe intereſts they profeſs to regard as their own, with harſhneſs, negligence, and indiſcreet familiarity; but nothing can be more fatal to friendſhip. It is a well known maxim, eſtabliſhed by general and uniform experience, that *too much familiarity occaſions mutual contempt.* And indeed how can it be otherwiſe? Mild obliging manners are underſtood as the natural genuine expreſſions of kindneſs and affection: boiſterous rudeneſs, petulence, and neglect, are naturally conſidered as expreſſive of oppoſite ſentiments. But if friendſhip aſſume the tone, the carriage, and the language of enmity or indifference, it muſt ſoon loſe all its native charms and advantages. Let the friend, as well as the caſual companion, when he finds reaſon to diſapprove of the ſentiments and conduct, or to diſſent from the opinions of his friend, expreſs himſelf in the gentleſt terms, with honeſty and ſincerity, but without careleſſneſs or harſhneſs. Let no frequency of intercourſe nor union of intereſts ever tempt to careleſs or contemptuous familiarity. Stiff and unmeaning ceremony may be baniſhed; but eaſe, and delicacy, and reſpectful deference, and obliging attention, muſt ſupply its room. Much of the unhappineſs of the marriage ſtate, and much of the mutual uneaſineſs which ariſes among thoſe who are related by the endearing ties of conſanguinity, is occaſioned by the parties who are thus cloſely connected, thinking it unneceſſary to obſerve the ordinary rules of good breeding in their mutual intercourſe. Even kindneſs puts on a diſguſting garb, and aſſumes an harſh aſpect. But mutual kindneſs cannot there long ſubſiſt. Home, which ought to be a ſanctuary to ſhelter from the anxieties and ills of life, a little paradiſe where thoſe pure and innocent pleaſures might be enjoyed which afford the moſt genuine happineſs, and which are not to be taſted in the buſtle of the buſy and the diſſipation of the gay world;—home thus becomes a place of torment, which is never entered but with pain and unwillingneſs; and from which the ſon, the daughter, the huſband, and the wife, eagerly ſeize every opportunity to eſcape.

Mutual confidence is the very ſoul of friendſhip. If friendſhip be rightly defined to be a mutual affection founded on mutual eſteem, thoſe who are united in the bonds of friendſhip cannot but repoſe mutual confidence in each other. Am I conſcious of none but generous worthy ſentiments, and none but upright honeſt intentions? I readily diſcloſe all the ſecrets of my ſoul to him whom I regard as capable only of ſimilar deſigns and ſimilar ſentiments. But it may be aſked, how far the confidence of friendſhip ought to be carried? Muſt I reveal to my friend all my ſentiments, opinions, and deſigns? Muſt I communicate to one friend the ſecrets which have been intruſted to me by another? Or muſt I rather obſerve the moſt ſuſpicious caution in my intercourſe with my friends, remembering that he who is now my friend may one day become my enemy? It ſeems moſt prudent to obſerve a medium between ſuſpicious caution and unlimited confidence. Were human virtue perfect, and were there no inſtances of friends ever becoming enemies, thoſe who regard each other with friendly affection might very reaſonably be required to ſet no bounds to their mutual confidence. But as this is far from being the caſe, different meaſures are to be obſerved. Contract no friendſhips, if you think it neceſſary to treat a friend with the ſame reſerve as an enemy. Yet venture not to diſcloſe to your friend all the fooliſh or evil deſigns which the wantonneſs of imagination may ſeduce you to form. When you feel the emotions of pride, of vanity, or of any evil paſſion, if you are able to repreſs them by the ſtrength of reaſon and conſcience, it ſeems unneceſſary for you to tell the ſtruggle, or to boaſt of the victory. If, at any former period of life, you have been ſo unfortunate as to commit actions which you cannot now recollect without ſhame and contrition, there can be no reaſon why you may not, as far as poſſible, bury the remembrance of them in your own breaſt. In ſhort, not to become tedious by deſcending to minute particulars, the laws of friendſhip do not require friends to unboſom themſelves to each other any farther than is neceſſary—to give them juſt ideas of each other's character and temper,—to enable them to be ſerviceable to each other in the proſecution of honeſt deſigns,—and to afford each of them proper opportunities of exciting the other to virtue and wiſdom, and of interpoſing his influence to preſerve him from vice and folly. Whatever is neceſſary for any of theſe purpoſes ought to be mutually communicated; whatever is not, may be concealed without violating the laws of friendſhip. As mutual eſteem is the foundation of friendſhip, and as human friendſhips are not always laſting, you ought not to pour into the ear of your friend all the impertinences which you may happen to conceive, nor even all the projects which may float in your imagination: but as much of the felicity of friendſhip ariſes from the mutual confidence to which it affords room, call not any man your friend in whoſe preſence you find it proper to obſerve the ſame ſuſpicious caution as if he were your enemy. The ancients, who talked of friendſhip with enthuſiaſm as one of the moſt elevated among the virtues, required ſtill a cloſer union and a more diſintereſted attachment among friends than we dare venture to inſiſt upon. The mutual duties which they have deſcribed as incumbent on friends, appear ſomewhat

what extravagant. Among other things, ſome of them have gone ſo far as to require a degree of mutual confidence which would ſoon deſtroy all confidence, and could not fail to counteract all the purpoſes of friendſhip : they have required one friend to communicate to another, not only all his own thoughts and purpoſes, but even thoſe ſecrets which have been confided to his honour by any other friend. But the evil conſequences which ſhould reſult are eaſily to be foreſeen. Perhaps, like Atticus, you enjoy the friendſhip of men who are mutual enemies ; and by communicating the ſecrets of the one to the other, you will then become the betrayer of both. Or, though not abſolutely enemies, yet thoſe who are *your* friends may happen not to be in habits of friendſhip with each other ; and they may then perhaps not ſcruple to divulge thoſe ſecrets of one another which you have imprudently blabbed to them. Indeed, might we ſuppoſe all mankind abſolutely faultleſs, and not liable to moral imperfection, we need not fear theſe bad conſequences from unbounded confidence in our friends. But friendſhip would in ſuch a ſtate of ſociety be unknown ; juſt as in the golden age of the poets there are ſuppoſed to have been no diſtinctions of property. We cannot here forbear dropping an obſervation, which will readily be acknowledged as juſt by all who have any tolerable knowledge of the morality of the philoſophers of ancient Greece. All their doctrines and precepts appear calculated for a different order of beings than mankind. They glanced careleſsly at the phenomena of the moral world ; and gleaning a few facts, immediately ſet themſelves to erect ſyſtems. From theſe, however wild and theoretical, they then pretended to deduce laws for the regulation of human conduct ; and their rules are generally ſuch as might be expected from the means which they appear to have employed in order to arrive at them. An apology has however been offered for ſome of them, which in our opinion, could occur only to ſuperficial obſervers of human life. It has been alledged in behalf of the Stoics, that their ſyſtem indeed required more exalted virtue than human nature is capable of attaining ; but that, notwithſtanding this, it could not fail to produce the happieſt effects on the manners and ſentiments of its votaries. Inſtances, too, have been produced in ſupport of this aſſertion ; a Cato, an Epictetus, an Antoninus. When we contemplate a model of perfection beyond what we can hope to reach, ſay the advocates of the Stoic philoſophy, though we deſpair of attaining, yet we are prompted to aſpire after it. Now, the moſt natural way of reaſoning here ſeems to lead to a very different concluſion. If an object is ſet before me which I muſt not hope to obtain, I am unwilling to waſte my time and exhauſt my vigour in the purſuit of it : bid me aſcend an inacceſſible height, I view the vale below with new fondneſs. Philoſophy, as well as ſuperſtition and enthuſiaſm might in a few inſtances triumph over the principles of nature ; but was it always equally powerful ? Were all the diſciples of Zeno Catos or Epictetuſes ? Have all the monks and anchorites of the Romiſh church been holy as the founders of their orders ? No : the Greek philoſophers who infeſted Rome, and taught thoſe *whimſical* doctrines which we hear frequently dignified with the name of *ſublime*, were ſingularly corrupted and licentious in their manners. If thoſe of the *regular* clergy of the church of Rome have been always more pure, they have been cruelly calumniated. Aſk, then, only what I am capable of performing : if you demand what is above my ſtrength, I ſit ſtill in indolence. In its general tendency, the Stoic philoſophy was favourable rather to vice than to virtue.

But we have not yet exhauſted all the duties of friendſhip. We have inculcated ſincerity, and mutual reſpect and obligingneſs of manners : we have alſo endeavoured to aſcertain, what degree of mutual confidence ought to take place between friends. But an important queſtion ſtill remains to be conſidered : how far is an *union of intereſts* to take place between friends? Am I to ſtudy the intereſt of my friend in preference to my own ? May I lawfully injure others, in order to ſerve him ? Here, too, we muſt conſider the circumſtances and the ſtrength of human nature ; and let us beware of impoſing burdens too heavy to be borne. The greater and more perfect the union which reigns in ſociety, the greater will be its ſtrength and happineſs ; the cloſer the union of friends, the more advantages will each of them derive from their union. Where other ties beſides thoſe of friendſhip concur to unite two individuals, their intereſts will be more cloſely conjoined than if they were connected by the ties of friendſhip alone. The order of nature ſeems here to be,—the huſband and wife—the parent and child—brothers and ſiſters, the offspring of the ſame parents—friends, connected by the ties of friendſhip alone. And, if we may preſume to gueſs at the intentions of the Author of nature from what we behold in his works and read in his word, the cloſeſt union in ſociety ought to be that between the huſband and the wife ; their intereſts are altogether the ſame ; they ought mutually to forego convenience and gratification for each other's ſake. The intereſts of parents and children are ſomewhat leſs cloſely connected ; much is due from the one to the other, but ſomewhat leſs than in the former relation ; their intereſts may ſometimes be ſeparate, but never ought to be oppoſite. Next come brethren, and other more diſtant relations ; and next, the friend. In theſe caſes, where we ſuppoſe the attachment of friendſhip to operate together with the ties of nature, we perceive that intereſts are variouſly united, and various duties are due ; ſcarce in any of them does it appear that the intereſts of the two can become entirley one. Still leſs can that be expected to happen, where the ties of friendſhip act not in concert with thoſe of nature. We give up, therefore, all thoſe romantic notions, which ſome have ſo earneſtly inſiſted on, of requiring the friend to conſider his friend as himſelf. We cannot expect any two individuals to poſſeſs preciſely the ſame degree of knowledge, to entertain exactly the ſame ſentiments, or to ſtand in circumſtances preciſely ſimilar. But till this happen, the intereſts of two can never be preciſely the ſame. And we will not, therefore, require the friend actually to prefer his friend to himſelf ; nay, we will even allow him to prefer himſelf to his friend ; convinced that ſuch is the deſign of nature, and that by preſuming to counteract the principles of nature we will be able to ſerve no uſeful purpoſe. But as far as the firſt principles of human action and the inſtitutions of ſociety permit, we may reaſonably require of friends, that they mutually endeavour to contribute each to the other's intereſt. You will not deſert your own family, nor neglect what is abſolutely neceſſary for your own preſervation, in order that you may ſerve a friend. It is not requiſite that you be either a Damon or a Pythias. Away with what is romantic; but ſcruple not to ſubmit to what is natural and reaſonable. When your friend needs your direction and advice, freely and honeſtly give it: does he need more than advice; your active exertions in his behalf? the laws of friendſhip require you not to refuſe them. Is it neceſſary for him to receive ſtill more ſubſtantial aſſiſtance? You may even be expected to aid him with your fortune. But remember, that even the amiable principle of benevolence muſt be ſubject to the directions of prudence: if incapable of taking care of ourſelves, we cannot be expected to contribute to the good of others: ſociety would not be favourable to the happineſs of the human race, if every individual ſtudied the general intereſt ſo far as to neglect his own. We are not born to be citizens of the world; but Europeans or Americans, Engliſhmen or Scotchmen. Let every one, then, ſeek the intereſt and happineſs of his friends with whom he is connected by the laws of friendſhip alone, in ſubordination to his own particular intereſt and happineſs, and to the intereſt and happineſs of thoſe with whom he is connected by the ties of nature and the general inſtitutions of ſociety. Engage not in the ſervice of your friend, nor laviſh your fortune in his behalf, if by that means you are likely to injure either yourſelf or your family. Still leſs will you think it requiſite to carry your friendſhip to ſuch romantic exceſs as to commit crimes in the ſervice of your friend. The ancients, whoſe ideas of the nature and duties of friendſhip were romantic and extravagant, have, ſome of them, required that a friend ſhould heſitate at no action, however atrociouſly wicked, by which he can be uſeful to his friend. Have I been guilty of theft or murder, or any other heinous violation of the laws of morality or the inſtitutions of ſociety: when I am brought to juſtice for my crime, if you, being my friend, are appointed to ſit as my judge, the laws of friendſhip, ſay thoſe admirable maſters of morality, require that you pronounce me innocent, though convinced of my guilt. But we need not declaim againſt the abſurdity of enjoining ſuch baſe deeds as duties of friendſhip. The idea of a connection, the laws of which are inimical to the order of ſociety, muſt ſtrike with horror every perſon who thinks of it. Such a connection is the union of a knot of villains, conſpiring againſt the peace, nay even the exiſtence of ſociety.

7
General view of the advantages of friendſhip.

Such we apprehend to be the nature of rational friendſhip; ſuch the circumſtances in the order of nature and of ſociety which are moſt favourable to this union; and ſuch the duties, by the performance of which it may be maintained. When founded on theſe principles, and regulated by theſe laws, friendſhip is truly virtuous, and cannot but be highly beneficial to the individuals between whom it ſubſiſts, and to the intereſt of ſociety in general. How delightful to have ſome perſon of an amiable and virtuous character in whom you can confide; who will join with you in the proſecution of virtuous deſigns, or will be ready to call you back when you heedleſsly ſtray into the paths of vice and folly! who will adminiſter to you honeſt, upright advice; will rejoice in your proſperity, will glory over your virtues, and will be ready to conſole and relieve you when ſinking under the preſſure of diſtreſs! Muſt not your connection with ſuch a perſon be favourable to your virtue, your intereſt, and your happineſs? When we ſurvey any ſublime or beauteous ſcene in nature, we wiſh for ſome perſon of congenial taſte and feelings to participate with us in the noble enjoyment which the proſpect affords; when we read any fine piece of compoſition, the pleaſure which we receive from it is more exquiſite if others join with us in applauding it. The landſcape which we have often ſurveyed, the poem which we have often read, pleaſe us anew, with all the charms of novelty, when we have an opportunity of pointing out their beauties to ſome perſon to whom they have been hitherto unknown. Friendſhip communicates new charms and a more delicate reliſh to all our moſt refined and elegant pleaſures. It enlivens our joys, it ſoothes and alleviates our ſorrows. What Cicero has ſaid of polite letters and philoſophy, may be with ſtill ſtronger propriety ſaid of friendſhip. In every condition of life the influence of virtuous friendſhip is favourable to our welfare and our happineſs; in proſperity, in adverſity; in the ſilence and tranquillity of retirement, as well as amid the hurry of buſineſs; in the boſom of your family, and when ſurrounded by your neareſt connections, no leſs than when removed to a ſtrange country. Indeed, whatever advantages ſociety beſtows above what are to be enjoyed in a ſavage ſtate, not leſs numerous nor leſs important are thoſe which we may derive from uniting in the bonds of friendſhip, rather than living in a ſtate of enmity or indifference.

8
Miſtakes in forming friendſhips, and conſequent inconſtancy.

But though friendſhip, when founded on mutual eſteem, and regulated by the laws of prudence, benevolence, and honeſty, be productive of ſo many happy effects; yet many inſtances occur in the world, in which connections dignified with the name of friendſhip are unfavourable both to the virtue and the happineſs of thoſe between whom they ſubſiſt. When men aſſociate from views of convenience; when their union is haſtily formed without a knowledge of each other's temper and character; when they are drawn together by accident, as when they happen to agree in the purſuits of the ſame intereſts or pleaſures; when the young and the gay reſort together to the haunts of diſſipation, and the covetous and ambitious find it convenient to toil in concert for riches and power: on all ſuch occaſions, the connection which is formed and dignified with the name of friendſhip is unworthy of that honourable appellation. It is not virtuous; it is productive of no happy effects, and is quickly diſſolved. He, therefore, who is not incapable of virtuous friendſhip, and is deſirous of enjoying its advantages, muſt carefully conſider the nature of the connection which he wiſhes to form, gain a thorough acquaintance with the character of the perſon whoſe eſteem and affection he wiſhes to acquire, and attend to thoſe rules by the obſervance of which true friendſhip may be maintained.

9
Relation illuſtrating the power of friendſhip over the human heart.

Many inſtances are related, which ſhow what power it is poſſible for friendſhip to acquire over the human heart. We need not here repeat the well-known ſtory of Damon and Pythias, whoſe generous friendſhip afforded a ſpectacle which ſoftened even the ſavage heart of Dionyſius. It is known to every ſchool-boy; and, after the affected narrative of Valerius Maximus, has been ſtudiouſly detailed and commented on by almoſt every ſucceeding ſtory-teller or moraliſt. Addiſon, in one of his Spectators, gives a beautiful little relation, we know not upon what authority, which finely illuſtrates the power both of friendſhip and love. Two male negroes, in one of the Weſt-India iſlands, nearly of the ſame age, and eminent among their fellows in ſlavery for gracefulneſs of figure, ſtrength, agility, and dexterity, were alſo diſtinguiſhed for their mutual friendſhip and for their common attachment to a young female negro, who was generally eſteemed the moſt beautiful of her complexion in the whole iſland. The young female appeared to be equally pleaſed with both her lovers; and was willing to accept either of them for a huſband, provided they could agree between themſelves which of them ſhould yield to the pretenſions of the other. But here lay the difficulty; for while neither would treacherouſly ſupplant, neither of them was willing to yield to his friend. The two youths, therefore, long ſuffered the ſevereſt affliction, while their hearts were torn between love and friendſhip. At length, when they were no longer able to endure the agony of ſuch a conteſt, being ſtill unable to repreſs their paſſion for their lovely countrywoman, and incapable of violating the laws of friendſhip,—on a certain day, they both, in company with the object of their ill-fated love, retired into a wood adjoining to the ſcene of their labours. There, after fondly embracing the maid, calling her by a thouſand endearing names, and lamenting their own unhappy fate, they ſtabbed a knife into her breaſt; which, while ſtill reeking with her blood, was by each of them in his turn plunged into his own. Her cries reached the people who were at work in the next field: ſome of them haſtening to the ſpot, found her expiring, and the two youths already dead beſide her.

We have introduced this little narrative as a ſtriking inſtance of the noble effects which naturally reſult from genuine friendſhip. Here we ſee it ſuperior to the force of the moſt violent of paſſions. Had the elevated ſouls of thoſe negro youths been refined and enlightened by culture and education in the principles of morality and true religion, we may reaſonably ſuppoſe that their friendſhip would have triumphed over their love, without prompting them to the raſh and deſperate deed which they committed.

10
Friendſhip not inconſiſtent with the ſpirit of Chriſtianity.

Friendſhip, thus amiable in its character, thus beneficial in its influence and effects, the theme of unbounded panegyric to the philoſophers and moraliſts of every age, has been ſaid by ſome reſpectable modern writers to be inconſiſtent with the ſpirit of that holy religion which we profeſs, and which we regard as the revelation of heaven. General benevolence is frequently inculcated through the goſpel: Jeſus often earneſtly intreated his diſciples, "to love one another;" and directed them in what manner to diſplay their mutual love, by telling them, that "whatſoever things they could reaſonably wiſh to receive from others, the ſame ought they to do them." The writers of the epiſtles often enlarge on the topics of charity and brotherly love. But private friendſhip is no where recommended in the code of Chriſtianity. Nay, it is ſo inconſiſtent with that univerſal benevolence which the goſpel injoins, that where the one is recommended and enforced, the other may be underſtood to be tacitly forbidden. But can that religion be true, or can it be favourable to the happineſs of its votaries, which is inimical, nay which is even not friendly to virtuous friendſhip? Such are the ſuggeſtions of Lord Shafteſbury and Soame Jenyns on this head.

We muſt grant them, that the ſyſtem of morals or religion which diſcourages a connection ſo noble in its origin, ſo amiable in its character, and ſo beneficial in its influence, as virtuous friendſhip, is rather unfavourable to the happineſs and virtue of its votaries. But we muſt conſider the genius of Chriſtianity with more careful attention, before we ſuffer ourſelves to be perſuaded that friendſhip is inconſiſtent with it. Univerſal benevolence is, indeed, inculcated in the goſpel: we are required to love our neighbours as ourſelves; and our Saviour ſeems to inſinuate, in the ſtory of the humane Samaritan, that we ought to regard as neighbours all our brethren of the human race, however ſeparated from us by any of the diſtinctions of ſociety. But it would be unfair to conclude from this that the great author of the goſpel meant to aboliſh the order of ſocial life or to oppoſe the ties of nature. Theſe may ſtill be reſpected, though the laws of this benevolence be obeyed. The parent is not required to deſert his child, in order that he may aſſiſt or relieve his neighbour; nor the child to leave his parent to periſh under the infirmities of old age, while he haſtes to lend aſſiſtance to a ſtranger. The goſpel was not intended to diſſolve communities, or to abbrogate the diſtinctions of rank. In Jeſus the end of the ceremonial law was accompliſhed: by him, therefore, that burthen of types and ceremonies with which the Jews had been loaded was taken away. But he who aboliſhed the ceremonial law declared, that the obligations of the moral law ſhould be more permanent than heaven or earth: The duties which it enjoyed were ſtill to be religiouſly diſcharged: The precepts of the Goſpel were to illuſtrate and enforce, not to contradict, the inſtitutions of the moral law. The relative duties of parents and children were ſtill to be performed; though men were directed not to confine all their ſentiments of benevolence to domeſtic relations. Jeſus, in his conduct, did not ſet himſelf to oppoſe the order of ſociety. In various parts of the New Teſtament all the ſocial duties are defined and enforced; the mutual duties of parents and children, of huſbands and wives, and of maſters and ſervants. The ſubmiſſion of all the members of a community to that power which is veſted with the authority of the whole, is alſo ſtrictly enjoined in the goſpel. Jeſus, when in his laſt moments he recommended his mother to the protection of his beloved diſciple, choſe to aſk *him* to conſider *her* as a parent; and directed *her* to expect from *him* the reſpect and kindneſs of a ſon. Theſe facts and obſervations teach us in what ſenſe to underſtand that univerſal benevolence which is inculcated in the goſpel. Though we are to love all mankind; yet it is not neceſſary that all the individuals of the human race ſhare our affection alike. Were we powerful, and wiſe, and benevolent, as the Deity, ſuch extenſive benevolence might be required of us: But our ſphere of action and obſervation is narrow; we cannot extend our acquaintance or influence beyond a very limited circle. Were we to endeavour to be equally uſeful to all mankind, we ſhould become incapable of being uſeful to any individual. We cannot become citizens of the world in the ſenſe in which ſome philoſophers have affected to call themſelves ſuch, without becoming outcaſts from every particular ſociety. A ſon, a brother, a countryman, a ſtranger, lie around you, each in circumſtances of extreme diſtreſs; you pity their misfortunes, and would gladly adminiſter relief: but ſuch is your benevolence, that you feel preciſely the ſame degree of compaſſion for each of them; you cannot determine to whom you ſhould firſt ſtretch out an helping hand; and you therefore ſtand like that venerable aſs of the ſchoolmen, whoſe tantalizing ſituation between two bundles of hay has been ſo long celebrated and lamented by metaphyſicians; and ſuffer ſon, and brother, and countryman, and ſtranger, to periſh, without relieving any of them by your kind offices. It is therefore the deſign of the goſpel, that we ſhould ſubmit to the laws of nature, and comply with the inſtitutions of ſociety. Firſt, attend to ſelf-preſervation; next perform the duties of a wife or huſband,—a parent,—a child,—a brother,—a citizen,—an individual of the human race. You will do well, indeed, to regard all mankind with benevolence; but your benevolence will be unavailing to the objects of it, if you overlook the diſtinctions of nature and thoſe inſtitutions which ſupport the union of ſocial life.

But if the ſpirit of Chriſtianity be not inimical to the inſtitutions and relations of ſociety, neither can it be unfavourable to friendſhip. If that benevolence which the goſpel enjoins, admit of any modifications, why not of that particular modification which conſtitutes private friendſhip? It is not indeed, directly enjoined; but neither is it forbidden. It is perfectly conſiſtent with the general tendency and ſpirit of the goſpel ſyſtem: being favourable to the intereſts of ſociety, it cannot but be agreeable to our holy religion.

But it is recommended by no direct precept, ſay thoſe who would repreſent Chriſtianity as inimical to it; while it has been the favourite theme of the philoſophers and moraliſts of the heathen world.

But why ſhould friendſhip be recommended by means different from thoſe which the goſpel employs for the purpoſe? Make yourſelf well acquainted with that admirable ſyſtem which you ſo earneſtly oppoſe; you will find that even the duties of private friendſhip are better explained and more powerfully enforced in the goſpel, than by all the heathen philoſophers and poets from Heſiod to Plutarch. The goſpel makes a diſtinction between the virtuous and the vicious; it repreſents one character as more amiable and reſpectable than another. As it diſtinguiſhes between virtue and vice, between piety and impiety; ſo its great object is to deter us from vice, and to encourage us to the practice of virtue. It cannot be ſuppoſed, then, that the goſpel will direct us to aſſociate indifferently with virtuous and profligate characters. It does not. It directs us to ſeek improvement, by aſſociating with thoſe whom we have reaſon to eſteem. It directs thoſe who are incorrigibly wicked to be expelled from ſociety. What is this but to command us to enter into habits of intimacy wherever there is ground for mutual eſteem? But this is the only baſis of genuine friendſhip. When all the means which lead to a certain end are laid before you, and when you are particularly directed by ſome high authority to employ thoſe means; though the end which you thus attain be not pointed out, yet the commanding you to employ ſuch a ſeries of means, is evidently the ſame as if you were directed to accompliſh the purpoſe to which they tend. Thus, though the precepts of Chriſtianity do not directly enjoin private friendſhip; yet they have a direct tendency to form thoſe exalted characters who alone are capable of true friendſhip; they inculcate thoſe virtues which naturally give riſe to this generous attachment, and are abſolutely neceſſary to ſupport it where it is formed; they inculcate benevolence by the moſt effectual motives, and admit of modifications of that benevolence, correſpondent to the relations and inſtitutions of ſociety: And therefore they may conſidered in as ſtrong and direct terms, as if it had been expreſsly ſaid, "Cultivate private friendſhip." Beſides, friendſhip is rather an *accident* of ſociety, a natural conſequence of our character as moral and ſocial beings, than a relation to be regulated and defined by inſtitutions.

11
Friendſhip countenanced by our Saviour's example.

This union, ſo natural between virtuous perſons, has been countenanced by the example of the Author of our religion; to whoſe life, no leſs than to his doctrines and precepts, we will do well to look for a ſtandard by which we may regulate our conduct. We allude to two remarkable inſtances which occur in the evangelical hiſtory; and with the recital of which, as ſtated in all their ſtriking circumſtances by a very elegant writer*, we ſhall conclude the preſent article.

"The evangeliſt, in relating the miracle which Chriſt performed at Bethany by reſtoring a perſon to life who had lain ſome days in the grave, introduces his narrative by emphatically obſerving, that 'Jeſus loved Lazarus;' intimating, it ſhould ſeem, that the ſentiments which Chriſt entertained of Lazarus were a diſtinct and peculiar ſpecies of that general benevolence with which he was actuated towards all mankind. Agreeably to this explication of the ſacred hiſtorian's meaning, when the ſiſters of Lazarus ſent to acquaint Jeſus with the ſtate in which their brother lay, they did not even mention his name; but pointing him out by a more honourable and equally notorious deſignation, the terms of their meſſage were, 'Behold! he whom thou loveſt is ſick!' Accordingly, when he informs his diſciples of the notice he had thus received, his expreſſion is, 'Our friend Lazarus ſleepeth.' Now that Chriſt did not upon this occaſion uſe the word *friend* in its looſe undiſtinguiſhed acceptation, but in a reſtrained and ſtrictly appropriated ſenſe, is not only manifeſt from this plain account of the fact itſelf, but appears farther evident from the ſequel. For as he was advancing to the grave, accompanied with the relations of the deceaſed, he diſcovered the ſame emotions of grief as ſwelled the boſoms of thoſe with whom Lazarus had been moſt intimately connected; and ſympathizing with their common ſorrow, he melted into tears. This circumſtance was too remarkable to eſcape particular obſervation: and it drew from the ſpectators, what one would think it muſt neceſſarily draw from every reader, this natural and obvious reflection, 'Behold! how he loved him!'

"But in the concluding cataſtrophe of our Saviour's life, he gave a ſtill more deciſive proof that ſentiments of

* W. Melmoth, Eſq; in the concluding note to his *Tranſlation of Cicero's Lælius.*

of the ſtrongeſt perſonal attachment and friendſhip were not unworthy of being admitted into his ſacred boſom: they were too deeply, indeed, impreſſed, to be extinguiſhed even by the moſt excruciating torments. In thoſe dreadful moments, obſerving among the afflicted witneſſes of his painful and ignominious ſufferings, that faithful follower who is deſcribed by the hiſtorian as 'the diſciple whom he loved;' he diſtinguiſhed him by the moſt convincing inſtance of ſuperior confidence, eſteem, and affection, that ever was exhibited to the admiration of mankind. For, under circumſtances of the moſt agonizing torments, when it might be thought impoſſible for human nature to retain any other ſenſibility but that of its own inexpreſſible ſufferings, he recommended to the care and protection of this his tried and approved friend, in terms of peculiar regard and endearment, the moſt tender and ſacred object of his private affections. But no language can repreſent this pathetic and affecting ſcene with a force and energy equal to the ſublime ſimplicity of the Evangeliſt's own narrative: 'Now there ſtood by the croſs of Jeſus, his mother and his mother's ſiſter, and Mary Magdalene. When Jeſus ſaw his mother and the diſciple (ſtanding) by, whom he loved; he ſaith to his mother, Behold thy ſon! then he ſaith to the diſciple, Behold thy mother! And from that hour that diſciple took her to his own home.'

"It may ſafely be aſſerted, that among all thoſe memorable examples of friendſhip, which have been celebrated with the higheſt encomiums by the ancients, there cannot be produced a ſingle inſtance in which the moſt diſtinguiſhing features of exalted amity are ſo ſtrongly diſplayed as in the foregoing relation. The only one, perhaps, that bears even a faint ſimilitude to it, is that famous tranſaction † recorded by a Greek author, which paſſed between Eudamidas and Aretheus. But when the very different circumſtances attending the reſpective examples are duly conſidered, it muſt be acknowledged, that the former riſes as much above the latter in the proof it exhibits of ſublime friendſhip, as it does in the dignity of the characters concerned.

† Already recited in this article, p.466, col.2.

"Upon the whole, then, it appears, that the divine Founder of the Chriſtian religion, as well by his own example as by the ſpirit of his moral doctrine, has not only encouraged but conſecrated friendſhip."

PRIESLAND, one of the united provinces of the Low Countries. It is bounded on the eaſt by the river Lauvers, which parts it from the lordſhip of Groningen, on the ſouth by Overyſſel, on the weſt by the Zuider-Zee, and on the north by the German ocean. It is 30 miles from the north to ſouth, and 28 from eaſt to weſt. The land is very fertile in corn and paſture; the horſes are large, and the cows and ſheep prolific. It is divided into three parts; Weſtergo to the weſt, Oſtergo to the eaſt, and Sevenwalden to the ſouth. The iſlands of Sheling, Ameland, and other ſmall ones, are dependent on this province. The principal towns are Lewarden the capital, Franeker, Dockum, Harlingen, and Staveren.

Friesland (Eaſt), a province of Germany, in the circle of Weſtphalia, lying near the German ocean. It is bounded on the ſouth by the biſhopric of Munſter, on the eaſt by the county of Oldenburg, on the weſt by the province of Groningen, and on the north by the ſea, being about 50 miles in length, and 30 in breadth. It belongs to Pruſſia, and was formerly called the *county of Embden*. It is a very fertile country, and feeds a great number of cattle; but it was greatly damaged by an inundation in 1717, and the repair of the dykes coſt an immenſe ſum. The principal towns are Norden, Leer, Eſſens, Whitmunde, and Aurick. Embden was an imperial city, and the principal place in the country; but now belongs alſo to the king of Pruſſia, who bought it of the Dutch.

FRIGATE, in ſea affairs, a ſhip of war uſually of two decks, light built, deſigned for ſwift ſailing. When it hath but one deck, and conſequently is of a ſmaller ſize, they call her a light frigate.

Frigates mount from 20 to 44 guns, and are eſteemed excellent cruiſers. The name was formerly known only in the Mediterranean, and applied to a long kind of veſſel navigated in that ſea with ſails and oars. The Engliſh were the firſt who appeared on the ocean with theſe ſhips, and equipped them for war as well as for commerce.

Frigate-built, denotes the diſpoſition of the decks of ſuch merchant ſhips as have a deſcent of four or five ſteps from the quarter-deck and fore-caſtle into the waiſt, in contradiſtinction to thoſe whoſe decks are on a continued line for the whole length of the ſhip, which are called *galley-built*.

FRIGATOON, a Venetian veſſel, commonly uſed in the Adriatic, built with a ſquare ſtern, and without any fore-maſt, having only a main-maſt, mizen-maſt, and bow-ſprit.

FRIGHT, or Terror, a ſudden and violent degree of fear. See Fear.

Sudden fear is frequently productive of very remarkable effects upon the human ſyſtem. Of this many inſtances occur in medical writings.—In general, the effects of terror are a contraction of the ſmall veſſels and a repulſion of the blood in the large and internal ones; hence proceed a ſuppreſſion of perſpiration, a general oppreſſion, trembling, and anguiſh of the heart, and lungs overcharged with blood.

Frights often occaſion incurable diſeaſes, as epilepſy, ſtupor, madneſs, &c. In acute diſeaſes, they have evidently killed many, by the agitation into which they have thrown the ſpirits, already too much diſordered. We have alſo accounts of perſons abſolutely killed by terrors when in perfect health at the time of receiving the ſhock from them: people ordered to be executed, but with private orders for a reprieve, have expired at the block without a wound.—Out of many inſtances of the fatal effects of fear recorded in writers, the following is ſelected as one of the moſt ſingular. "George Grochantzy, a Polander, who had inliſted as a ſoldier in the ſervice of the king of Pruſſia, deſerted during the laſt war. A ſmall party was ſent in purſuit of him; and when he leaſt expected it, they ſurpriſed him ſinging and dancing among a company of peaſants, who were got together in an inn and were making merry. This event, ſo ſudden and unforeſeen, and at the ſame time ſo dreadful in its conſequences, ſtruck him in ſuch a manner, that, giving a great cry, he became at once altogether ſtupid and inſenſible, and was ſeized without the leaſt reſiſtance. They carried him away to Glocau, where he was brought before the council of war, and received ſentence as a deſerter. He ſuffered himſelf to be led and diſpoſed of at the will of thoſe about him, without uttering a word, or giving the leaſt ſign that he knew what had happened or would happen to him. He remained immoveable as a ſtatue wherever he was placed, and was wholly paſſive with reſpect to all that was done to him or about him. During all the time that he was in cuſtody, he neither eat, nor drank, nor ſlept, nor had any evacuation. Some of his comrades were ſent to ſee him; after that he was viſited by ſome officers of his corps and by ſome prieſts; but he ſtill continued in the ſame ſtate, without diſcovering the leaſt ſigns of ſenſibility. Promiſes intreaties, and threatenings, were equally ineffectual. The phyſicians who were conſulted upon his caſe were of opinion, that he was in a ſtate of hopeleſs idiocy. It was at firſt ſuſpected, that thoſe appearances were feigned; but theſe ſuſpicions neceſſarily gave way, when it was known that he took no ſuſtenance, and that the involuntary functions of nature were in a great meaſure ſuſpended. After ſome time they knocked off his fetters and left him at liberty to go whither he would. He received his liberty with the ſame inſenſibility that he had ſhowed upon other occaſions: he remained fixed and immoveable; his eyes turned wildly here and there without taking cognizance of any object, and the muſcles of his face were fallen and fixed like thoſe of a dead body. Being left to himſelf, he paſſed 20 days in this condition, without eating, drinking, or any evacuation, and died on the 20th day. He had been ſometimes heard to fetch deep ſighs; and once he ruſhed with great violence on a ſoldier, who had a mug of liquor in his hand, forced the mug from him, and having drank the liquor with great eagerneſs, let the mug drop to the ground.

When a perſon is affected with terror, the principal endeavour ſhould be to reſtore the circulation to its due order, to promote perſpiration, and to allay the agitation of the patient. For theſe purpoſes he may drink a little warm liquor, as camomile-tea, &c. the feet and legs may be put into warm water, the legs rubbed, and the camomile-tea repeated every ſix or eight minutes; and when the ſkin is warm, and there is a tendency to perſpiration, ſleep may be promoted by a gentle opiate.

But frights have been known not only to cauſe, but alſo to cure, diſeaſes. Mr Boyle * mentions agues, gout, and ſciatica, cured by this means.

To turn from the ſerious to the ludicrous effects of fear, the following inſtance of the latter ſort, quoted from a French author by Mr Andrews in his volume of Anecdotes, ſhows upon what ſlight occaſions this paſſion may be ſometimes excited in a very high degree, even in perſons the moſt unlikely to entertain ſuch a gueſt. "Charles Guſtavus (the ſucceſſor of Chriſtina of Sweden) was beſieging Prague, when a boor of moſt extraordinary viſage deſired admittance to his tent; and being allowed entrance, offered, by way of amuſing the king, to devour a whole hog of one hundred weight in his preſence. The old general Koningſmarc, who ſtood by the king's ſide, and who, ſoldier as he was, had not got rid of the prejudices of his childhood, hinted to his royal maſter that the peaſant ought to be burnt as a ſorcerer. 'Sir,' ſaid the fellow, irritated at the remark, 'if your majeſty will but make that old gentleman take off his ſword and his ſpurs, I will eat him immediately before I begin the hog.' General Konnigſmarc (who had, at the head of a body of Swedes, performed wonders againſt the Auſtrians, and who was looked upon as one of the braveſt men of the age) could not ſtand this propoſal, eſpecially as it was accompanied by a moſt hideous and preternatural expanſion of the frightful peaſant's jaws. Without uttering a word, the veteran ſuddenly turned round, ran out of the court, and thought not himſelf ſafe until he had arrived at his quarters; where he remained above 24 hours locked up ſecurely, before he had got rid of the panic which had ſo ſeverely affected him."

Fear (Dr Beattie † obſerves) ſhould not riſe higher than to make us attentive and cautious; when it gains an aſcendency in the mind, it becomes an inſupportable tyranny, and renders life a burden. The object of fear is evil; and to be exempt from fear, or at leaſt not enſlaved to it, gives dignity to our nature, and invigorates all our faculties. Yet there are evils which we ought to fear. Thoſe that ariſe from ourſelves, or which it is in our power to prevent, it would be madneſs to deſpiſe, and audacity not to guard againſt. External evils which we cannot prevent, or could not avoid without a breach of duty, it is manly and honourable to bear with fortitude. Inſenſibility to danger is not fortitude, no more than the incapacity of feeling pain can be called patience; and to expoſe ourſelves unneceſſarily to evil is worſe than folly, and very blameable preſumption. It is commonly called fool-hardineſs; that is, ſuch a degree of hardineſs or boldneſs as none but fools are capable of. See the article FORTITUDE.

FRIGID *(frigidus)*, in a general ſenſe, denotes the quality of being cold. It is frequently applied to a jejune ſtyle, that is unanimated by any ornaments, and conſequently without any force or vigour.

FRIGID Zone. See ZONE.

FRIGIDITY, in medicine, the ſame with IMPOTENCE.

FRIGORIFIC, in phyſiology, ſmall particles of matter, which, according to Gaſſendus and others, being actually and eſſentially cold, and penetrating other bodies, produce in them that quality which we call *cold*. See COLD.

FRILAZIN, the name of a claſs or rank of people among the Anglo-Saxons, conſiſting of thoſe who had been ſlaves, but had either purchaſed, or by ſome other means obtained, their liberty. Though theſe were in reality free men, they were not conſidered as of the ſame rank and dignity with thoſe who had been born free, but were ſtill in a more ignoble and dependent condition, either on their former maſters or on ſome new patrons. This cuſtom the Anglo-Saxons ſeem to have derived from their anceſtors in Germany, among whom thoſe who had been made free did not differ much in point of dignity or importance in the ſtate from thoſe who continued in ſervitude. This diſtinction between thoſe who have been made free and thoſe who enjoy freedom by deſcent from a long race of free men, ſtill prevails in many parts of Germany; and particularly in the original ſeats of the Anglo-Saxons. Many of the inhabitants of towns and cities in England, in this period, ſeem to have been of this claſs of men, who were in a kind of middle ſtate between ſlaves and freemen.

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* *Works, Abr.* p. 82. &c.

† *Elements of Moral Science.*

FRILL, in falconry. When a hawk trembles or ſhivers, they ſay ſhe frills.

Plate CCIII.

FRINGILLA, in ornithology, a genus belonging to the order of paſſeres. The bill is conical, ſtraight, and ſharp-pointed. There are no leſs than 108 ſpecies comprehended under this genus, diſtinguiſhed principally by varieties in their colour. The following are the moſt noted.

1. The *carduelis*, or GOLDFINCH, with the quill-feathers red forwards, and the outermoſt without any ſpots; the two outermoſt are white in the middle, as the reſt are at the point. The young bird before it moults is grey on the head; and hence it is termed by the bird-catchers a *grey-pate*. There is a variety of goldfinches called by the London bird-catchers a *cheverel*, from the manner in which it concludes its jerk. It is diſtinguiſhed from the common ſort by a white ſtreak, or by two, ſometimes three white ſpots under the throat. Their note is very ſweet; and they are much eſteemed on that account, as well as for their great docility. Towards winter, they aſſemble in flocks; and feed on ſeeds of different kinds, particularly thoſe of the thiſtle. It is fond of orchards, and frequently builds in an apple or pear-tree: its neſt is very elegantly formed of fine moſs, liverworts, and bents, on the outſide; lined firſt with wool and hair, and then with the goſlin or cotton of the ſallow. It lays five white eggs, marked with deep purple ſpots on the upper end; and has two broods in the year. When kept in cages, they are commonly fed much on hemp-ſeed, which they eat freely, but which is ſaid to make them grow black, and loſe both their red and yellow. The goldfinch is a long-lived bird, often attaining the age of 20 years.—This ſpecies is plenty throughout Europe; it is alſo met with both in Aſia and Africa, but leſs common.

2. The *cœlebs*, or CHAFFINCH, hath black limbs, and the wings white on both ſides; the three firſt feathers of the tail are without ſpots, but two of the chief are obliquely ſpotted. It has its name from its delighting in chaff. This ſpecies entertains agreeably with its ſong very early in the year, but towards the latter end of ſummer aſſumes a chirping note: both ſexes continue in Britain the whole year. What is very ſingular in Sweden, the females quit that country in September, migrating in flocks into Holland, leaving their mates behind: in the ſpring they return. In Hampſhire Mr White has obſerved ſomething of this kind; vaſt flocks of females with ſcarcely any males among them. Their neſt is almoſt as elegantly conſtructed as that of the goldfinch, and of much the ſame materials, only the inſide has the addition of ſome large feathers. They lay four or five eggs of a dull white colour, tinged and ſpotted with deep purple. They are caught in plenty in flight-time; but their neſts are rarely found, though they build in hedges and trees of all ſorts. They make their neſts of moſs and wool, or any thing they can gather up; and have young ones thrice a-year. They are ſeldom bred from the neſt, as being a bird not apt to learn another's ſong, nor to whiſtle; ſo that it is beſt to leave the old ones to bring them up. The Eſſex finches are generally allowed to be the beſt ſort, both for length of ſong and variety, ending with ſeveral notes that are very pretty. It is an hardy bird, and will live almoſt upon any ſeeds, none coming amiſs to him. He is ſeldom ſubject to diſeaſe, but will be very louſy if not ſprinkled with wine two or three times a-month.

3. The *montifringilla*, or BRAMBLING, has a yellow bill tipt with black; the head, hind part of the neck, and back, are black; the throat, fore part of the neck, and breaſt, pale rufous orange; lower part of the breaſt and belly white; the quill feathers brown, with yellowiſh edges; the tail a little forked: the legs grey. This ſpecies migrates into England at certain ſeaſons, but does not build there. It is frequently found among chaffinches, and ſometimes comes in vaſt flocks. They are alſo ſeen at certain times in vaſt clouds in France, inſomuch that the ground has been quite covered with their dung, and more than 600 dozen were killed each night. They are ſaid to be particularly fond of beech maſt, but will alſo eat ſeeds of various other kinds. Their fleſh is eaten by many, but is apt to prove bitter. They are ſaid to breed about Luxemburg, making the neſt on the tall fir-trees, compoſed of long moſs without, and lined with wool and feathers within: the eggs are four or five in number, yellowiſh, and ſpotted: and the young are fledged at the end of May. This ſpecies is found more or leſs throughout Europe; and is common in the pine foreſts of Ruſſia and Siberia, but thoſe of the laſt are darker in colour and leſs in ſize.

4. The *domeſtica*, or SPARROW, hath the prime feathers of the wings and tail brown, the body variegated with grey and black, and a ſingle white ſtreak on the wings. Theſe well-known birds are proverbially ſalacious, and have three broods in a year. They are every where common about houſes, where they build in every place they can find admittance; under the roof, corner of the brick-work, or in holes of the wall. They make a ſlovenly neſt; generally a little hay ill put together, but lined well with feathers; where they lay five or ſix eggs of a reddiſh white colour ſpotted with brown. They will ſometimes build in the neighbouring trees, in which caſe they take more pains with the neſt: and not unfrequently they expel the martins from theirs, to ſave the trouble of conſtructing one of their own. The ſparrow, from frequenting only habitations and parts adjacent, may be ſaid to be chiefly fed from human induſtry; for in ſpite of every precaution, it will partake with the pigeons, poultry, &c. in the food thrown out to them, grain of all kinds being moſt agreeable to its taſte; though it will eat refuſe from the kitchen of moſt kinds. It is a familiar but crafty bird, and will not ſo eaſily come into a ſnare as many others. In autumn they often collect into flocks, and rooſt in numbers on the neighbouring trees, when they may be ſhot by dozens, or at night caught in great numbers by a bat fowling-net. The fleſh is accounted tolerable by many. The ſparrow has no ſong, only a chirp or two frequently repeated, and far from agreeable. This ſpecies is ſpread every where throughout Europe; and is alſo met with in Egypt, Senegal, Syria, and other parts of Africa and Aſia.

5. The *ſpinus*, or SISKIN, hath the prime feather of the wings yellow in the middle, and the four firſt chief tail-feathers without ſpots; but they are yellow at the

baſe, and black at the points. Mr Willoughby tells us, that this is a ſong-bird: that in Suſſex it is called the *barley-bird*, becauſe it comes to them in barley-ſeed time. We are informed that it viſits Britain at very uncertain times, like the groſs beak, &c. It is to be met with in the bird-ſhops in London; and being rather a ſcarce bird, ſells at a higher price than the merit of its ſong deſerves: it is known there by the name of the *aberdavine*. It is a very tame and docile ſpecies; and is often kept and paired with the canary-bird, with which it breeds freely. The bird-catchers have a notion of its coming out of Ruſſia. Dr Kramer informs us, that this bird conceals its neſt with great art; and though there are infinite numbers of young birds in the woods on the banks of the Danube, which ſeem juſt to have taken flight, yet no one could diſcover it.

6. The *linota*, or LINNET, has the bottom of the breaſt of a fine blood-red, which heightens as the ſpring advances. Theſe birds are much eſteemed for their ſong. They feed on ſeeds of different kinds, which they peel before they eat; the ſeed of the linum or flax is their favourite food; from whence the name of the linnet tribe. They breed among furze and white thorn: the outſide of their neſt is made with moſs and bents, and lined with wool and hair. They lay five whitiſh eggs, ſpotted like thoſe of the goldfinch.

7. The *cannabina*, or GREATER RED-POLE, is rather leſs than the common linnet, and has a blood-coloured ſpot on the forehead, and the breaſt of the male is tinged with a fine roſe-colour. It is a common fraud in the bird-ſhops in London, when a male-bird is diſtinguiſhed from the female by a red-breaſt, as in the caſe of this bird, to ſtain or paint the feathers, ſo that the deceit is not eaſily diſcovered, without at leaſt cloſe inſpection. Theſe birds are frequent on the Britiſh coaſts; and are often taken in flight-time near London: it is a familiar bird; and is cheerful in five minutes after it is caught.

8. The *linaria*, or LESSER RED-POLE, is about half the ſize of the laſt, and a rich ſpot of purpliſh red on the forehead: the breaſt is of the ſame colour, but leſs bright. The female is leſs lively in colour; has no red on the breaſt; and the ſpot on the forehead is of a ſaffron hue. This ſpecies is common enough in England; and lays four or five eggs of a pale bluiſh green, thickly ſprinkled near the blunt end with ſmall reddiſh ſpots. Mr Pennant mentions an inſtance of this bird being ſo tenacious of her neſt, as to ſuffer herſelf to be taken off by the hand; and that when releaſed ſhe would not forſake it. This ſpecies is known about London by the name of *ſtone redpole*. Linnæus, Kramer, and others, mention its being very fond of the ſeeds of alder. Whole flocks of them, mixed with the ſiſkin, frequent places where alders grow, for the ſake of picking the catkins: they generally hang like the titmouſe, with the back downwards; and in this ſtate are ſo intent on their work, that they may be entangled one after another by dozens, by means of a twig ſmeared with birdlime faſtened to the end of a fiſhing rod or other long pole. This ſpecies ſeems to be in plenty throughout Europe, from the extreme parts of Ruſſia on the one hand to Italy on the other. Is very common in Greenland, and was alſo met with by late voyagers at Aoonalaſhka. In America it is likewiſe well known. Hence it ſeems to be a bird common to the whole of the northern part of the globe without exception.

9. The *montium*, or TWITE, is about the ſize of a linnet. It has the feathers of the upper part of the body duſky; thoſe on the head edged with aſh-colour, the others with browniſh red: the rump is pale crimſon; the wings and tail are duſky, the tips of the greater coverts and ſecondaries whitiſh; the legs pale brown. The female wants the red mark on the rump. Twites are taken in the flight-ſeaſon near London along with other linnets. It is probable that the name has been taken from their twittering note, having no muſic in it; and indeed the bird-catchers will tell at ſome diſtance whether there be any twites mixed among linnets merely from this circumſtance. The twite is ſuppoſed to breed in the more northern parts of Britain.

10. The *amandava*, or AMADUVADE BIRD, is about the ſize of a wren. The colour of the bill is of a dull red; all the upper parts are brown, with a mixture of red; the under the ſame, but paler, the middle of the belly darkeſt; all the feathers of the upper wing-coverts, breaſt, and ſides, have a ſpot of white at the tip; the quills are of a grey brown; the tail is black; and the legs are of a pale yellowiſh white. It inhabits Bengal, Java, Malacca, and other parts of Aſia.

11. The *Senegala*, or SENEGAL FINCH, is a ſpecies very little bigger than a wren. The bill is reddiſh, edged all round with brown; and beneath the under mandible a line of brown quite to the tip; the ſame alſo is ſeen on the ridge of the upper mandible: the upper parts of the body are of a vinaceous red colour; the lower parts, with the thighs and under tail-coverts, of a greeniſh brown; the hind part of the head and neck, the back, ſcapulars, and wing coverts, are brown; the tail is black; and the legs are pale grey. It inhabitants Bengal; and, with the former ſpecies, feeds on millet. This affords the natives an eaſy method of catching them: they have no more to do than to ſupport a large hollowed gourd, the bottom uppermoſt, on a ſtick, with a ſtring leading to ſome covered place, and ſtrewing under it ſome millet; the little birds, haſtening in numbers to pick it up, are caught beneath the trap, by the ſtick being pulled away by the obſerver at a diſtance. The females are ſaid to ſing nearly as well as the males. They are familiar birds; and when once uſed to the climate, will frequently live five or ſix years in a cage. They have been bred in Holland by the fanciers of birds.

12. The *canaria*, or CANARY-BIRD, hath a whitiſh body and bill, with the prime feathers of the wings and tail greeniſh. It was originally peculiar to thoſe iſles to which it owes its name; the ſame that were known to the ancients by the addition of the *Fortunate*. Though the ancients celebrate the iſle of Canaria for the multitude of birds, they have not mentioned any in particular. It is probable, then, that the ſpecies was not introduced into Europe till after the ſecond diſcovery of theſe iſles, which was between the 13th and 14th centuries. We are uncertain when it firſt made its appearance in that quarter of the globe. Belon, who wrote in 1555, is ſilent in reſpect to theſe birds: Geſner is the firſt who mentions them; and Al-

drovand ſpeaks of them as rarities, obſerving that they were very dear on account of the difficulty attending the bringing them from ſo diſtant a country, and that they were purchaſed by people of rank alone. They are ſtill found on the ſame ſpot to which we were firſt indebted for the production of ſuch charming ſongſters; but they are now become ſo numerous in our own country, that we are under no neceſſity of croſſing the ocean for them.—The Canary-bird will prove fertile with the ſiſkin and goldfinch; but in this caſe the produce, for the moſt part, proves ſterile: the pairs ſucceed beſt when the hen-bird is the Canary, and the cock of the oppoſite ſpecies. It will alſo prove prolific with the linnet, yellow-hammer, chaffinch, and even the houſe ſparrow; but the male Canary-bird will not aſſimilate with the female of theſe birds; the hen muſt be ever of the Canary ſpecies, and the young of theſe moſtly prove male birds.—This bird is ſaid by ſome to live 10 or 15 years; by others, as far as 18.

FRIPPERY, a French term ſometimes uſed in our language to ſignify the trade or traffic of old ſecond-hand clothes and goods. The word is alſo uſed for the place where ſuch ſort of commerce is carried on, and even for the commodities themſelves. The company of frippiers, or fripperers, at Paris, are a regular corporation, of an ancient ſtanding, and make a conſiderable figure in that city.

FRISII, Friſei, Friſiones, and Friſones, (anc. geog.), a people of Germany, ſo called either from their ardent love of freedom, or from the freſh and unbroken lands they occupied, contradiſtinguiſhed from the old lands. Tacitus divides them, from their extent of power and territory, into the Majores, ſituated on the coaſt between the Rhine and the Ems; and into the Minores, occupying the parts about the lakes lying between the channels of the Rhine.

FRIT, or Fritt, in the glaſs manufacture, is the matter or ingredients whereof glaſs is to be made, when they have been calcined or baked in a furnace.

A ſalt drawn from the aſhes of the plant kali or from fern, or other plants mixed with ſand or flint, and baked together, makes an opaque maſs called by glaſs-men *frit*; probably from the Italian *frittare*, to fry; or becauſe the frit, when melted, runs into lumps, like fritters, called by the Italians *fritelli*.

Frit, by the ancients, was called *ammonitrum*, of ἄμμος, *ſand*, and νιτρον, *nitre*; under which name it is deſcribed by Pliny thus: Fine ſand from the Volturnian ſea, mixed with three times the quantity of nitre, and melted, makes a maſs called *ammonitrum*; which being rebaked makes pure glaſs.

Frit, Neri obſerves, is only the calx of the materials which make glaſs; which though they might be melted, and glaſs be made, without thus calcining them, yet it would take up much more time. This calcining, or making of frit, ſerves to mix and incorporate the materials together, and to evaporate all the ſuperfluous humidity. The frit, once made, is readily fuſed, and turned into glaſs.

There are three kinds of frits. The firſt, cryſtal frit, or that for cryſtal metal, is made with ſalt of pulverine and ſand. The ſecond, and ordinary frit, is made of the bare aſhes of pulverine or barilla, without extracting the ſalt from them. This makes the ordinary white or cryſtal metal. The third is frit for green glaſſes, made of common aſhes, without any preparation. This laſt frit will require ten or twelve hours baking.

The materials in each are to be finely powdered, waſhed, and ſearced; then equally mixed, and frequently ſtirred together in the melting pot. For the reſt ſee Glass, and Crystal.

FRITH, in its moſt uſual acceptation, ſignifies the mouth or opening of a river into the ſea; ſuch are the Frith of Forth or of Edinburgh, the Frith of Clyde, Moray Frith, &c.

FRITILLARIA, fritillary: A genus of the monogynia order, belonging to the hexandria claſs of plants; and in the natural method ranking under the 10th order, *Coronariæ*. The corolla is hexapetalous and campanulated, with a nectariferous cavity above the heel in each petal; the ſtamina are as long as the corolla. There are five ſpecies, all of them bulbous-rooted flowery perennials, producing annual ſtalks from about one foot to a yard or more high, terminated by large, bell-ſhaped, liliaceous flowers, of a great variety of colours. They are all propagated by offſets, which they furniſh abundantly from the ſides of their roots, and which may be ſeparated every ſecond or third year; they are hardy plants, and will thrive in any of the common borders.

FRIULI, a province of Italy, ſubject to Venice, and bounded by Carinthia in Germany on the north, by Carniola on the eaſt, by the Gulph of Venice on the ſouth, and by the Belluneſe and Feltrin on the weſt.

FRIZE, or Frieze, in architecture, a part of the entablature of columns, more uſually written and pronounced *freeze*. See Freeze.

Frize, or Freeze, in commerce, a kind of woollen cloth or ſtuff for winter wear, being frized or knapt on one ſide; whence, in all probability, it derives its name.

Of frizes, ſome are croſſed, others not croſſed: the former are chiefly of Engliſh manufacture, the latter of Iriſh.

FRIZING of Cloth, a term in the woollen manufactory, applied to the forming of the nap of cloth or ſtuff into a number of little hard burrs or prominences, covering almoſt the whole ground thereof.

Some clothes are only frized on the back ſide, as black cloths; others on the right ſide, as coloured and mixed cloths, rateens, bays, friezes, &c.

Frizing may be performed two ways. One with the hand, that is, by means of two workmen, who conduct a kind of plank that ſerves for a frizing inſtrument. The other way is by a mill, worked either by water or a horſe, or ſometimes by men. This latter is eſteemed the better way of frizing, by reaſon the motion being uniform and regular, the little knobs of the frizing are formed more equably and regularly. The ſtructure of this uſeful machine is as follows:

The three principal parts are the frizer or criſper, the frizing table, and the drawer or beam. The two firſt are two equal planks or boards, each about 10 feet long and 15 inches broad; differing only in this, that the frizing table is lined or covered with a kind of coarſe woollen ſtuff, of a rough ſturdy knap; and the frizer is incruſtated with a kind of cement compoſed of glue, gum-arabic, and a yellow ſand, with a little aqua-vitæ, or urine. The beam, or drawer, thus called, ed, becauſe it draws the ſtuff from between the frizer and the frizing-table, is a wooden roller, beſet all over with little, fine, ſhort points or ends of wire, like thoſe of cards uſed in carding of wool.

The diſpoſition and uſe of the machine is thus. The table ſtands immoveable, and bears or ſuſtains the cloth to be frized, which is laid with that ſide uppermoſt on which the nap is to be raiſed : over the table is placed the frizer, at ſuch a diſtance from it as to give room for the ſtuff to be paſſed between them : ſo that the frizer, having a very ſlow ſemicircular motion, meeting the long hairs or naps of the cloth, twiſts, and rolls them into little knobs or burrs ; while, at the ſame time, the drawer, which is continually turning, draws away the ſtuff from under the frizer, and winds it over its own points.

All that the workman has to do while the machine is a-going, is to ſtretch the ſtuff on the table as faſt as the drawer takes it off, and from time to time to take off the ſtuff from the points of the drawer.

The deſign of having the frizing-table lined with ſtuff of a ſhort, ſtiff, ſtubby nap, is that it may detain the cloth between the table and the frizer long enough for the grain to be formed, that the drawer may not take it away too readily, which muſt otherwiſe be the caſe as it is not held by any thing at the other end. It were unneceſſary to ſay any thing particular of the manner of frizing ſtuffs with the hand, it being the aim of the workmen to imitate, as near as they can with their wooden inſtrument, the ſlow, equable, and circular motion of the machine : it needs only be added, that their frizer is but about two feet long and one broad ; and that to form the nap more eaſily, they moiſten the ſurface of the ſtuff lightly, with water mingled with whites of eggs or honey.

FROBENIUS (John), a famous and learned printer in the 16th century, was born at Hamelburgh in Franconia, and ſettled at Baſil. He had before ſtudied in that univerſity, where he acquired the reputation of being uncommonly learned ; and now ſetting up a printing-houſe in that city, was the firſt of the German printers who brought that admirable art to any degree of perfection. Being a man of great probity and piety, as well as ſkill, he was particularly choice in the authors he printed ; and would never, for the ſake of profit, ſuffer libels, or any thing that might hurt the reputation of another, to go through his preſs. The great character of this printer was the principal motive which induced Eraſmus to reſide at Baſil, in order to have his own works printed by him. A great number of valuable authors were printed by Frobenius, with great care and accuracy; among which were the works of St Jerome, Auguſtine, and Eraſmus. He deſigned to have printed the Greek Fathers ; but died in 1527, before he could execute his deſign. Eraſmus wrote his epitaph in Greek and Latin.

John Frobenius left a ſon, named *Jerome Frobenius*, and a daughter married to Nicholas Epiſcopius ; who, joining in partnerſhip, continued Frobenius's printing-houſe with reputation, and printed correct editions of the Greek Fathers.

FROBISHER, or FORBISHER (Sir Martin), an excellent navigator and ſea-officer in the 16th century, was born near Doncaſter in Yorkſhire, and was from his youth brought up to navigation. He was the firſt Engliſhman who attempted to find a north-weſt paſſage to China, and in 1576 he ſailed with two barks and a pinnace in order to attempt that paſſage. In this voyage he diſcovered a cape, to which he gave the name of *Queen Elizabeth's Foreland*, and the next day diſcovered a ſtrait to which he gave his own name. This voyage proving unſucceſsful, he attempted the ſame paſſage in 1577; but diſcovering ſome ore in an iſland, and his commiſſion directing him in this voyage only to ſearch for ore, and to leave the farther diſcovery of the north-weſt to another time, he returned to England. He ſailed again, with 15 ſhips and a great number of adventurers, to form a ſettlement : but being obſtructed by the ice, and driven out to ſea by a violent ſtorm, they, after encountering many difficulties, returned home, without making any ſettlement, but brought a large quantity of ore.—He afterwards commanded the Aid in Sir Francis Drake's expedition to the Weſt Indies, in which St Domingo in Hiſpaniola, Carthagena, and Santa Juſtina, in Florida, were taken and ſacked. In 1588, he bravely exerted himſelf in defence of his country againſt the Spaniſh armada, when he commanded the Triumph, one of the largeſt ſhips in that ſervice; and, as a reward for his diſtinguiſhed bravery, received the honour of knighthood from the lord high-admiral at ſea. He afterwards commanded a ſquadron which was ordered to cruiſe on the Spaniſh coaſt ; and in 1592 took two valuable ſhips and a rich carrack. In 1594 he was ſent to the aſſiſtance of Henry IV. king of France againſt a body of the Leaguers and Spaniards, who had ſtrongly entrenched themſelves at Croyzon near Breſt ; but in an aſſault upon that fort, on the 7th of November, Sir Martin was unfortunately wounded with a ball, of which he died ſoon after he had brought back the fleet to Plymouth, and was buried in that town.

FROBISHER's Straits, lie a little to the northward of Cape Farewell in Weſt Greenland, and were diſcovered by Sir Martin Frobiſher. W. Long. 48. 16. N. Lat. 63. 12.

FRODSHAM, a town of Cheſhire in England, 162 miles from London, is noted for its ancient caſtle. It has a ſtone-bridge over the river Weaver near its conflux with the Merſey, and a harbour for ſhips of good burden. By the late inland navigation, it has communication with the rivers Dee, Ribble, Ouſe, Trent, Darwent, Severn, Humber, Thames, Avon, &c. which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, York, Lancaſter, Weſtmoreland, Stafford, Warwick, Leiceſter, Oxford, Worceſter, &c.

FROG, in zoology. See RANA.

Bull-FROG. See RANA.

FROG-Fiſh of Surinam, a very ſingular animal, of which a figure is given by Mr Edwards, *Hiſt. of Birds*, Vol. I. There is no ſpecimen in the Britiſh muſeum, nor in any private collection, except that of Dr Fothergill. It was brought from Surinam in South America.—Frogs, both in Aſia and Africa, according to Merian, change gradually from Fiſhes to frogs, as thoſe in Europe; but after many years revert again into fiſhes, though the manner of their change has never been inveſtigated. In Surinam theſe fiſhes are called *jakjês*. They are cartilaginous, of a ſubſtance like the muſtela, and exquiſite food: they are formed with regular vertebræ, and ſmall bones all over the body divided into equal parts; are firſt darkiſh, and then grey: their ſcales make a beautiful appearance. Whether this animal is, in its perfect ſtate, a ſpecies of frog with a tail, or a kind of water-lizard, Mr Edwards does not pretend to determine; but obſerves, that when its ſize is conſidered, if it ſhould be deemed a tadpole at firſt produced from ſpawn, and in its progreſs towards a frog, ſuch an animal, when full grown, if it bears the ſame proportion to its tadpole as thoſe in Europe do, muſt be of enormous ſize; for our full grown frogs exceed the tadpoles at leaſt 50 times. See a reduced figure on Plate CCIII.

FROME, a river that riſes from ſeveral ſprings in the Weſtern parts of Dorſetſhire in England, the principal of which is near Everſhot; and directing its courſe almoſt due weſt, paſſes under Frampton-bridge, waſhes the town of Dorcheſter, and falls into a bay of the Engliſh Channel called *Poolhaven*, near Wareham.

Frome-Selwood, a town of Somerſetſhire in England, 105 miles from London. It is the chief town of this part of the country, which was anciently one great foreſt called *Selwoodſhire*; and in the latter end of the laſt century, in thoſe called *Frome-Woodlands*, there was a conſiderable gang of money-coiners or clippers, of whom many were taken and executed, and their covert laid open. Though the town is bigger than ſome cities, yet it has only one church; but it has ſix or ſeven meeting-houſes of Proteſtant diſſenters. The inhabitants are reckoned about 13,000, whoſe chief manufactory is broad-cloth. About 50 years ago, more wire cards for carding the wool for the ſpinners were made at this place than in all England beſides, which was for the moſt part ſupplied with them from hence; for here were no leſs than 20 maſter card-makers, one of whom employed 400 men, women, and children, in that manufactory at one time; ſo that even children of 7 or 8 years of age could earn half-a-crown a-week. The river here, which abounds with trout, eels, &c. riſes in the woodlands; and runs under its ſtone-bridge towards Bath, on the eaſt ſide of which it falls into the Avon. This town has been a long time noted for its fine beer, which they keep to a great age, and is generally preferred by the gentry to the wines of France and Portugal. It was governed formerly by a bailiff, and now by two conſtables of the hundreds of Frome, choſen at the court-leet of the lord of the manor.

FRONDESCENTIA, from *frons*, "a leaf;" the preciſe time of the year and month in which each ſpecies of plants unfolds its leaves.

All plants produce new leaves every year; but all do not renew them at the ſame time. Among woody plants, the elder, and moſt of the honey-ſuckles; among perennial herbs, crocus and tulip, are the firſt that puſh or expand their leaves. The time of ſowing the ſeeds decides with reſpect to annuals. The oak and aſh are conſtantly the lateſt in puſhing their leaves: the greateſt number unfold them in ſpring; the moſſes and firs in winter. Theſe ſtriking differences with reſpect to ſo capital a circumſtance in plants as that of unfolding their leaves, ſeem to indicate that each ſpecies of plants has a temperature proper or peculiar to itſelf, and requires a certain degree of heat to extricate the leaves from their buds, and produce the appearance in queſtion.

This temperature, however, is not ſo fixed or conſtant as it may appear to a ſuperficial obſerver. Among plants of the ſame ſpecies, there are ſome more early than others; whether that circumſtance depends, as it moſt commonly does, on the nature of the plants, or is owing to differences in heat, expoſure, and ſoil. In general, it may be affirmed, that ſmall and young trees are always earlier than larger or old ones.

The puſhing of the leaves is likewiſe accelerated or retarded according to the temperature of the ſeaſon; that is, according as the ſun is ſooner or later in diſpenſing that certain degree of heat which is ſuitable to each ſpecies.

FRONT, the forehead, or that part of the face above the eye-brows. The word is formed of the Latin *frons*; and that from the Greek φρονειν "to think, perceive;" of φρην *mens*, "the mind, thought." Martinius, to make out this etymology, obſerves, that from the forehead of a perſon we perceive what he is, what he is capable of, and what he thinks of.

Front, is alſo uſed where ſeveral perſons or things are ranged ſide by ſide, and ſhow their front or fore-parts.

Front, in architecture, denotes the principal face or ſide of a building, or that preſented to their chief aſpect or view.

FRONTAL, in architecture, a little fronton or pediment, ſometimes placed over a ſmall door or window.

Frontal, *Frontlet*, or *Brow-band*, is alſo uſed in ſpeaking of the Jewiſh ceremonies. This frontal conſiſts of four ſeveral pieces of vellum, on each whereof is written ſome text of ſcripture. They are all laid on a piece of a black calf's leather with thongs to tie it by. The Jews apply the leather with the vellum on their foreheads in the ſynagogue, and tie it round the head with the thongs.

FRONTIER, the border, confine, or extreme, of a kingdom or province, which the enemies find in front when they would enter the ſame. Thus we ſay, a frontier town, frontier province, &c. Frontiers were anciently called *marches*.

The word is derived from the French *frontiere*, and that from the Latin *frontaria*; as being a kind of front oppoſed to the enemy. Skinner derives *frontier* from *front*; inaſmuch as the frontier is the exterior and moſt advanced part of a ſtate, as the front is that of the face of a man.

FRONTIGNIAC wine, is ſo called from a town of Languedoc in France, ſituated 16 miles ſouth-weſt of Montpelier, remarkable for producing it.

FRONTINUS (Sextus Julius), an ancient Roman writer, was of conſular dignity, and flouriſhed under the emperors Veſpaſian, Titus, Domitian, Nerva, and Trajan. He commanded the Roman armies in Britain; was made city-prætor when Veſpaſian and Titus were conſuls; and Nerva made him curator of the aqueducts, which occaſioned his writing *De aquæductibus urbis Romæ*. He wrote four books upon the Greek and Roman art of war; a piece *De re agraria*, and another *De limitibus*. Theſe have been often ſeparately ly reprinted ; but were all collected together in a neat edition at Amſterdam in 1661, with notes by Robertus Keuchenius. He died under Trajan.

FRONTISPIECE, in architecture, the principal face of a fine building. The word is formed of the Latin *frontiſpicium*, q. d. *frontis hominis inſpectio.*—Hence alſo, by a figure, we ſay, the frontiſpiece of a book ; meaning an ornament with an engraven title on the firſt page.

FRONTLET. See Frontal.

FRONTO (Marcus Cornelius), was choſen for his eloquence to inſtruct the emperor Marcus Aurelius and Lucius Verus in rhetoric ; in recompence of which he was promoted to the conſolate, and a ſtatue was erected to his honour. He taught Marcus Aurelius not only eloquence, but the duty of kings, and excellent morals. Some ſay he wrote againſt the Chriſtians. A ſect was formed of thoſe who looked upon him as a model of perfect eloquence, and theſe were called *Frontoniani*. The Civilians, whoſe names were *Fronto*, mentioned in the pandects, were probably deſcended from him.

FROST, in phyſiology, ſuch a ſtate of the atmoſphere as occaſions the congelation or freezing of water and other fluids. See Congelation.

Under the articles Cold, Congelation, Evaporation, Fluidity, &c, it is ſhown, that water and other fluids are capable of containing the element of fire or heat in two very different ſtates. In the one, they ſeem to imbibe the fire in ſuch a manner, that it eludes all the methods by which we are accuſtomed to obſerve it, either by our ſenſation of feeling, or the thermometer ; in the other, it manifeſts itſelf obviouſly to our ſenſes, either by the touch, the thermometer, or the emiſſion of light.

In the firſt of theſe ſtates, we call the body *cold* ; and are apt to ſay that this coldneſs is occaſioned by the *abſence* of heat. But this manner of expreſſing ourſelves is certainly improper ; for even thoſe fluids which are coldeſt to the touch contain a vaſt deal of heat. Thus vapour, which is colder to the touch than the water from which it was raiſed, contains an immenſe quantity of fire, even more than ſufficient to heat it red hot. The like may be ſaid of common ſalt, and ſnow, or ice. If a quantity of each of theſe ſubſtances is ſeparately reduced to the degree of 28 or 30 of Fahrenheit's thermometer, upon mixing them together, the heat which would have raiſed the thermometer to the degree abovementioned, now enters into the ſubſtance of them in ſuch a manner that the mercury falls down to 0.—Here an exceſſive degree of cold is produced, and yet we are ſure that the ſubſtances contain the very ſame quantity of heat that they formerly did : nay, they will even ſeem exceedingly cold, when they moſt certainly contain a great deal more heat than they originally did ; for they abſorb it from all bodies around them ; and if a ſmall veſſel full of water is put in the middle of ſuch a mixture, it will in a ſhort time be full of ice.

It appears, therefore, that our ſenſes, even when aſſiſted by thermometers, can only judge of the ſtate in which the element of fire is with relation to the bodies around us, without regard to the quantity contained in them. Thus, if heat flows from any part of our body into any ſubſtance actually in contact with it, the ſenſation of cold is excited, and we call that ſubſtance *cold* ; but if it flows from any ſubſtance into our body, the ſenſation of heat is excited, and we call that ſubſtance *hot*, without regard to the abſolute quantity contained in either caſe. See Heat.

Of all known ſubſtances, the atmoſphere either abſorbs or throws out heat with the moſt remarkable facility : and in one or other of theſe ſtates it always is with reſpect to the ſurface of the earth, and ſuch bodies as are placed on or near it ; for theſe, properly ſpeaking, have no temperature of their own, but are entirely regulated by that of the atmoſphere.—When the air has been for ſome time abſorbing the heat from terreſtrial bodies, a froſt muſt be the undoubted conſequence, for the ſame reaſon that water freezes in a veſſel put into a freezing mixture ; and were this abſorption to continue for a length of time, the whole earth would be converted into a frozen maſs. There are, however, certain powers in nature, by which this effect is always prevented ; and the moſt violent froſt we can imagine, muſt always as it were defeat its own purpoſes, and end in a thaw. To underſtand this ſubject, we muſt obſerve,

1. In that ſtate of the atmoſphere which we denominate froſt, there is a moſt intimate union between the air and the water it contains ; and therefore froſty weather, except in very high latitudes, is generally clear.

2. When ſuch an union takes place, either in winter or ſummer, we obſerve the atmoſphere alſo inclined to abſorb heat, and conſequently to froſt. Thus in clear ſettled weather, even in ſummer, though the day may be exceſſively hot by reaſon of the continued ſunſhine, yet the mornings and evenings are remarkably cold, and ſometimes even diſagreeably ſo.

3. The air being therefore always ready in the time of froſt or in clear weather, to abſorb heat from every ſubſtance which comes into contact with it, it follows that it muſt alſo abſorb part of that which belongs to the vapours contained in it.

4. Though vapour is capable of becoming much colder than water without being frozen, yet by a continued abſorption it muſt at laſt part with its latent heat, *i. e.* that which eſſentially conſtitutes it vapour ; and without which it is no longer vapour, but water or ice. No ſooner, therefore, does the froſt arrive at a certain pitch, than the vapours, every where diſperſed through the air, give out their latent heat ; the atmoſphere then becomes clouded ; the froſt either totally goes off, or becomes milder by reaſon of the great quantity of heat diſcharged into the air ; and the vapours deſcend in rain, hail, or ſnow, according to the particular diſpoſition of the atmoſphere at the time.

5. Even in the polar regions, where it may be thought that the froſt muſt increaſe beyond meaſure, there are alſo natural means for preventing its running to extremes. The principal cauſe here is, the mixture of a great quantity of vapours from the more temperate regions of the globe with the air in thoſe dreary climates. It is well known, that aqueous vapour always flies from a warm to a colder place. For this reaſon, the vapours raiſed by the ſun in the more temperate regions of the earth, muſt continually travel northward and ſouthward in great quantities. Thus

they furniſh materials for thoſe immenſe quantities of ſnow and ice which are to be found in the neighbourhood of the poles, and which we cannot imagine the weak influence of the ſun in theſe parts capable of raiſing. It is impoſſible that a quantity of vapour can be mixed with froſty air, without communicating a great deal of heat to it; and thus there are often thaws of conſiderable duration even in thoſe climates where, from the little influence of the ſun, we ſhould ſuppoſe the froſt would be perpetual.

6. We may now account with ſome probability for the uncertain duration of froſts. In England they are ſeldom of a long continuance; becauſe the vapours raiſed from the ſea with which that iſland is ſurrounded, perpetually mix with the air over the iſland, and prevent a long duration of the froſt. For the ſame reaſon, froſts are never of ſuch long duration in maritime places on the continent as in the inland ones. There is nothing, however, more uncertain than the motion of the vapours with which the air is conſtantly filled; and therefore it is impoſſible to prognoſticate the duration of a froſt with any degree of certainty. In general, we may always be certain, that if a quantity of vapour is accumulated in any place, no intenſe froſt can ſubſiſt in that place for any length of time; and by whatever cauſes the vapours are driven from place to place, by the ſame cauſes the froſts are regulated throughout the whole world. See THAW, VAPOUR, &c.

The effects of froſt in ſeveral different countries, are enumerated under the article CONGELATION. In the northern parts of the world, even ſolid bodies are liable to be affected by froſt. Timber is often apparently frozen, and rendered exceedingly difficult to ſaw. Marle, chalk, and other leſs ſolid terreſtrial concretions, will be ſhattered by ſtrong and durable froſts. Metals are contracted by froſt: thus, an iron tube, 12 feet long, upon being expoſed to the air in a froſty night, loſt two lines of its length. On the contrary, froſt ſwells or dilates water near one-tenth of its bulk. Mr Boyle made ſeveral experiments with metalline veſſels, exceedingly thick and ſtrong; which being filled with water, cloſe ſtopped, and expoſed to the cold, burſt by the expanſion of the frozen fluid within them. Trees are frequently deſtroyed by froſt, as if burnt up by the moſt exceſſive heat; and in very ſtrong froſts, walnut-trees, aſhes, and even oaks, are ſometimes ſplit and cleft, ſo as to be ſeen through, and this with a terrible noiſe, like the exploſion of fire-arms.

Froſt naturally proceeds from the upper parts of bodies downwards: but how deep it will reach in earth or water, is not eaſily known; becauſe this depth may vary with the degree of coldneſs in the air, by a longer or ſhorter duration of the froſt, the texture of the earth, the nature of the juices wherewith it is impregnated, the conſtitution of its more internal parts as to heat and cold, the nature of its effluvia, &c. Mr Boyle, in order to aſcertain this depth, after four nights of hard froſt, dug in an orchard, where the ground was level and bare, and found the froſt had ſcarce reached three inches and a half, and in a garden nearer the houſe only two inches below the ſurface. Nine or ten ſucceſſive froſty nights froze the bare ground in the garden ſix inches and a half deep; and in the orchard, where a wall ſheltered it from the ſouth ſun, to the depth of eight inches and a half. He alſo dug in an orchard, near a wall, about a week afterwards, and found the froſt to have penetrated to the depth of 14 inches. In a garden at Moſcow, the froſt in a hard ſeaſon only penetrates to two feet: and the utmoſt effect that Captain James mentions the cold to have had upon the ground of Charlton iſland, was to freeze it to two feet deep: whence may appear the different degrees of cold of that iſland and Ruſſia. And as to the freezing of water at the abovementioned iſland, the Captain tells us, it does not naturally congeal above the depth of ſix feet, the reſt being by accident. Water alſo, expoſed to the cold air in large veſſels, always freezes firſt at the upper ſurface, the ice gradually increaſing and thickning downwards: for which reaſon, frogs retire in froſty weather to the bottom of ditches; and it is ſaid, that ſhoals of fiſh retire in winter to theſe depths of the ſea and rivers, where they are not to be found in ſummer. Water, like the earth, ſeems not diſpoſed to receive any very intenſe degree of cold at a conſiderable depth or diſtance from the air. The vaſt maſſes of ice found in the northern ſeas being only many flakes and fragments, which, ſliding under each other, are, by the congelation of the intercepted water, cemented together.

In cold countries, the froſt often proves fatal to mankind; not only producing gangrenes, but even death itſelf. Thoſe who die of it have their hands and feet firſt ſeized, till they grow paſt feeling it; after which the reſt of their bodies is ſo invaded, that they are taken with a drowſineſs, which if indulged, they awake no more, but die inſenſibly. But there is another way whereby it proves mortal, *viz.* by freezing the abdomen and viſcera, which on diſſection are found to be mortified and black.

The great power of froſt on vegetables is a thing ſufficiently known; but the differences between the froſts of a ſevere winter, and thoſe which happen in the ſpring mornings, in their effects on plants and trees, were never perfectly explained, till by Meſſ. Du Hamel and Buffon in the Memoirs of the Paris Academy.

The froſts of ſevere winters are much more terrible than thoſe of the ſpring, as they bring on a privation of all the products of the tenderer part of the vegetable world; but then they are not frequent, ſuch winters happening perhaps but once in an age; and the froſts of the ſpring are in reality greater injuries to us than theſe, as they are every year repeated.

In regard to trees, the great difference is this, that the froſts of ſevere winters affect even their wood, their trunks and large branches; whereas thoſe of the ſpring have only power to hurt the buds.

The winter froſts happening at a time when moſt of the trees in our woods and gardens have neither leaves, flowers, nor fruits upon them, and have their buds ſo hard as to be proof againſt ſlight injuries of weather, eſpecially if the preceeding ſummer has not been too wet; in this ſtate, if there are no unlucky circumſtances attending, the generality of trees bear moderate winters very well; but hard froſts, which happen late in the winter, cauſe very great injuries even to thoſe trees which they do not utterly deſtroy. Theſe are, 1. Long cracks following the direction of the fibres. 2. Parcels of dead wood incloſed round with wood yet in a living ſtate. And, 3. That diſtemperature which the foreſters call the *double blea*, which is a perfect circle of blea, or ſoft white wood, which, when the tree is afterwards felled, is found covered by a circle of hard and ſolid wood.

The opinions of authors about the expoſition of trees to the different quarters, have been very different, and moſt of them grounded on no rational foundation. Many are of opinion that the effects of froſt are moſt violently felt on thoſe trees which are expoſed to the north; and others think the ſouth or the weſt the moſt ſtrongly affected by them. There is no doubt but the north expoſure is ſubject to the greateſt cold. It does not, however, follow from this, that the injury muſt be always greateſt on the trees expoſed to the north in froſts; on the contrary, there are abundant proofs that it is on the ſouth ſide that trees are generally more injured by froſt: and it is plain from repeated experiments, that there are particular accidents, under which a more moderate froſt may do more injury to vegetables, than the moſt ſevere one which happens to them under more favourable circumſtances.

It is plain from the accounts of the injuries trees received by the froſts in 1709, that the greateſt of all were owing to repeated falſe thaws, ſucceeded by repeated new froſts. But the froſts of the ſpring-ſeaſon furniſh abundantly more numerous examples of this truth; and ſome experiments made by the Count de Buffon, at large in his own woods, prove inconteſtably, that it is not the ſevereſt cold or moſt fixed froſt that does the greateſt injury to vegetables.

This is an obſervation directly oppoſite to the common opinion; yet is not the leſs true, nor is it any way diſcordant to reaſon. We find by a number of experiments, that humidity is the thing that makes froſt fatal to vegetables; and therefore every thing that can occaſion humidity in them, expoſes them to theſe injuries, and every thing that can prevent or take off an over proportion of humidity in them, every thing that can dry them though with ever ſo increaſed a cold, muſt prevent or preſerve them from thoſe injuries. Numerous experiments and obſervations tend to prove this. It is well known that vegetables always feel the froſt very deſperately in low places where there are fogs. The plants which ſtand by a river ſide are frequently found deſtroyed by the ſpring and autumnal froſts, while thoſe of the ſame ſpecies, which ſtand in a drier place, ſuffer little or perhaps not at all by them; and the low and wet parts of foreſts are well known to produce worſe wood than the high and drier. The coppice wood in wet and low parts of common woods, though it puſh out more vigorouſly at firſt than that of other places, yet never comes to ſo good a growth; for the froſt of the ſpring killing theſe early top-ſhoots, obliges the lower part of the trees to throw out lateral branches: and the ſame thing happens in a greater or leſſer degree to the coppice wood that grows under cover of larger trees in great foreſts; for here the vapours not being carried off either by the ſun or wind, ſtagnate and freeze, and in the ſame manner deſtroy the young ſhoots, as the fogs of marſhy places. It is a general obſervation alſo, that the froſt is never hurtful to the late ſhoots of the vine, or to the flower-buds of trees, except when it follows heavy dews, or a long rainy ſeaſon, and then it never fails to do great miſchief, though it be ever ſo ſlight.

The froſt is always obſerved to be more miſchievous in its conſequences on newly cultivated ground than in other places; and this is becauſe the vapours which continually ariſe from the earth, find an eaſier paſſage from thoſe places than from others. Trees alſo which have been newly cut, ſuffer more than others by the ſpring froſts, which is owing to their ſhooting out more vigorouſly.

Froſts alſo do more damage on light and ſandy grounds, than on the tougher and firmer ſoils, ſuppoſing both equally dry; and this ſeems partly owing to their being more early in their productions, and partly to their lax texture ſuffering a greater quantity of vapours to tranſpire.

It alſo has been frequently obſerved, that the ſide-ſhoots of trees are more ſubject to periſh by the ſpring froſts than thoſe from the top; and M. Buffon, who examined into this with great accuracy, always found the effects of the ſpring froſts much greater near the ground than elſewhere. The ſhoots within a foot of the ground quickly periſhed by them; thoſe which ſtood at two or three feet high, bore them much better: and thoſe at four feet and upwards frequently remained wholly unhurt, while the lower ones were entirely deſtroyed.

There is a ſeries of obſervations, which have proved beyond all doubt, that it is not the hard froſts which ſo much hurt plants, as thoſe froſts, though leſs ſevere, which happen when they are full of moiſture; and this clearly explains the account of all the great damages done by the ſevere froſts being on the ſouth ſide of the trees which are affected by them, though that ſide has been plainly all the while leſs cold than the north. Great damage is alſo done to the weſtern ſides of trees and plantations, when after a rain with a weſt wind the wind turns about to the north at ſunſet, as is frequently the caſe in ſpring, or when an eaſt wind blows upon a thick fog before ſun-riſing.

*Hoar-*FROST, a cold moiſt vapour, that is drawn up a little way into the air, and in the night falls again on the earth, where it is congealed into icy cryſtals of various figures. Hoar-froſt, therefore, is nothing but dew turned into ice by the coldneſs of the air.

Melioration of Aromatic Spirits by FROST. Mr Baumé obſerves, that aromatic ſpirituous waters have leſs ſcent when newly diſtilled than after they have been kept about ſix months: and he found that the good effects of age was produced in a ſhort time by means of cold; and that, by plunging quart-bottles of the liquor into a mixture of pounded ice and ſea-ſalt, the ſpirit, after having ſuffered for ſix or eight hours the cold hence reſulting, proves as grateful as that which hath been kept many years. Simple waters alſo, after having been frozen, prove far more agreeable than they were before. Geoffroy takes notice of this melioration by froſt; *Hiſt. Acad.* 1713.

Melioration of Land by FROST. See AGRICULTURE, n° 137.

FROTH, a white light ſubſtance, formed on the ſurface of fluids by vehement agitation, conſiſting of little ſpherules or globules.

Froth-Spit, or *Cuckow-Spit*, a name given to a white froth or ſpume, very common in the ſpring and firſt months of ſummer, on the leaves of certain plants, particularly on thoſe of the common white field-lychnis or catch-fly, thence called by ſome *ſpatling poppy*.

All writers on vegetables have taken notice of this froth though few have underſtood the cauſe or origin of it till of late. It is formed by a little leaping animal, called by ſome the *flea graſs-hopper*, by applying its anus cloſe to the leaf, and diſcharging thereon a ſmall drop of a white viſcous fluid, which, containing ſome air in it, is ſoon elevated into a ſmall bubble; before this is well formed, it depoſits ſuch another drop, and ſo on, till it is every way overwhelmed with a quantity of theſe bubbles, which form the white froth which we ſee. Within this ſpume it is ſeen to acquire four tubercles on its back, wherein the wings are incloſed; theſe burſting, from a reptile it becomes a winged animal: and thus, rendered perfect, it flies to meet its mate, and propagate its kind. It has an oblong, obtuſe body, and a large head with ſmall eyes. The external wings, for it has four, are of a duſky brown colour, marked with two white ſpots: the head is black. It is a ſpecies of Cicada.

FROWDE (Philip), an Engliſh poet, was the ſon of a gentleman who had been poſt-maſter in the reign of queen Anne. He was ſent to the univerſity of Oxford, where he had the honour of being diſtinguiſhed by Addiſon, who took him under his protection. While he remained there, he became the author of ſeveral pieces of poetry, ſome of which in Latin were pure and elegant enough to intitle them to a place in the *Muſæ Anglicanæ*. He likewiſe wrote two tragedies; The Fall of Saguntum, dedicated to Sir Robert Walpole; and Philotas, addreſſed to the earl of Cheſterfield. He died at his lodgings at Cecil-ſtreet in the Strand, in 1738, and in the London Daily-Poſt had the following character given him: "Though the elegance of Mr Frowde's writings has recommended him to the general public eſteem, the politeneſs of his genius is the leaſt amiable part of his character; for he eſteemed the talents of wit and learning only as they were conducive to the excitement and practice of honour and humanity. Therefore, with a ſoul cheerful, benevolent, and virtuous, he was in converſation genteely delightful, in friendſhip punctually ſincere, in death Chriſtianly reſigned. No man could live more beloved, no private man could die more lamented." A fine eloge! and we have no reaſon to doubt the truth of it.

FRUCTESCENTIA, (from *fructus*, "fruit,") comprehends the preciſe time in which, after the fall of the flowers, the fruits arrive at muturity, and diſperſe their ſeeds.

In general, plants which flower in ſpring, ripen their fruits in ſummer, as rye; thoſe which flower in ſummer, have their fruits ripe in autumn, as the vine; the fruit of autumnal flowers ripens in winter, or the following ſpring, if kept in a ſtove or otherwiſe defended from exceſſive froſts. Theſe froſts, ſays M. Adanſon, are frequently ſo pernicious and violent as to deſtroy the greateſt part of the perennial plants of Virginia and Miſſiſſippi, that are cultivated in France, even before they have exhibited their fruit. The plants which flower during our winter, ſuch as thoſe of the Cape of Good Hope, ripen their fruit in ſpring in ſtoves.

FRUCTIFEROUS, ſignifies properly any thing that produces fruit.

FRUCTIFICATION of plants, is defined by Linnæus to be the temporary part of a vegetable appropriated to generation, terminating the old vegetable, and beginning the new. It conſiſts of the following ſeven parts; *viz.* the calyx, corolla, ſtamen, piſtillum, pericarpium, ſemen or ſeed, and receptaculum. See Botany, p. 446.

FRUIT, in its general ſenſe, includes whatever the earth produces for the nouriſhment and ſupport of animals; as herbs, grain, pulſe, hay, corn, flax, and every thing expreſſed by the Latins under the name *fruges*.

Fruit, in natural hiſtory, denotes the laſt production of a tree or plant, for the propagation or multiplication of its kind; in which ſenſe fruit includes all kinds of ſeeds, with their furniture, &c.

Fruit, in botany, is properly that part of a plant wherein the ſeed is contained; called by the Latins *fructus*; and by the Greeks καρπος. The fruit in the Linnæan ſyſtem is one of the parts of fructification, and is diſtinguiſhed into three parts, viz. the pericarpium, ſeed, and receptacle or *receptaculum ſeminum*. See Botany.

Colours Extracted from Fruits. See the article *Colour-Making*, nº 36.

Bread-Fruit. See Bread.

Fruits, with regard to commerce, are diſtinguiſhed into *recent* or *freſh*, and *dry*.

Recent Fruits, are thoſe ſold juſt as they are gathered from the tree, without any farther preparation; as are moſt of the productions of our gardens and orchards, ſold by the fruiterers.

Dry Fruits, are thoſe dried in the ſun, or by the fire, with other ingredients ſometimes added to them to make them keep; imported chiefly from beyond ſea, and ſold by the grocers. Such are raiſins, currants, figs, capers, olives, cloves, nutmegs, pepper, and other ſpices; which ſee under their reſpective articles.

Under the denomination of *dry fruits* are alſo frequently included apples, pears, almonds, filberds, &c.

Fruit-Flies, a name given by gardeners and others to a ſort of ſmall black flies found in vaſt numbers among fruit trees, in the ſpring ſeaſon, and ſuppoſed to do great injury to them. Mr Leuwenhoek preſerved ſome of theſe flies for his microſcopical obſervations. He found that they did not live longer than a day or two, but that the females during this time laid a great number of longiſh eggs. The gardeners who ſuppoſe that theſe flies wound the leaves of the trees, are miſtaken: it is true that they feed on their juices; but they have no inſtruments wherewith they can extract theſe for themſelves: they feed on ſuch as are naturally extravaſated; and when there is not a ſufficient quantity of theſe for their purpoſe, they haunt the places to which the pucerons reſort, and feed on the juices which theſe little creatures extravaſate by means of the holes they bore in the leaves with their trunks.

Fruit-Stones. The miſchiefs ariſing from the cuſtom which many people have of ſwallowing the ſtones of plums and other fruit are very great. The Philoſophical Tranſactions give an account of a woman who ſuffered violent pains in her bowels for 30 years, returning once in a month or leſs. At length, a ſtrong purge being given her, the occaſion of all theſe complaints was driven down from the bowels to the anus; where it gave a ſenſation of diſtenſion and ſtoppage, producing a continual deſire of going to ſtool, but without voiding any thing. On the aſſiſtance of a careful hand in this caſe, there was taken out with a forceps a ball of an oval figure, of about ten drachms in weight, and meaſuring five inches in circumference. This had cauſed all the violent fits of pain which ſhe had ſuffered for ſo many years; and, after voiding it, ſhe became perfectly well. The ball extracted looked like a ſtone, and felt very hard, but it ſwam in water. On cutting it through with a knife, there was found in the centre of it a plum-ſtone; round which, ſeveral coats of this hard and tough matter had gathered. Another inſtance given in the ſame papers is of a man, who, dying of an incurable colic which had tormented him many years, and baffled the effects of medicines, was opened after death; and in his bowels was found a ball ſimilar to that abovementioned; but ſomewhat larger, being ſix inches in circumference, and weighing an ounce and an half. In the centre of this, as of the other, there was found the ſtone of a common plum, and the coats were of the ſame nature with thoſe of the former.

Theſe and ſeveral other inſtances mentioned in the ſame place, ſufficiently ſhow the folly of that common opinion that the ſtones of fruits are wholeſome. For though by nature the guts are ſo defended by their proper mucus, that people very ſeldom ſuffer by things of this kind; yet if we conſider the various circumvolutions of the guts, their valves and cells, and at the ſame time conſider the hair of the ſkins of animals we feed on, the wool or down on herbs and fruit, and the fibres, veſſels, and nerves of plants, which are not altered by the ſtomach; it will appear a wonder that inſtances of this ſort of miſchief are not much more common. Cherry-ſtones, ſwallowed in great quantities, have occaſioned the death of many people; and there have been inſtances even of the ſeeds of ſtrawberries collecting into a lump in the guts, and cauſing violent diſorders, which could not be cured without great difficulty.

Fruit-Trees. With regard to theſe it may be obſerved, 1. That the cutting and pruning them when young, ſcrimp their bearing, though it contributes to the richneſs and flavour of the fruit, as well as to the beauty of the tree. 2. That kernel-fruit trees come later to bear than ſtone-fruit trees: the time required by the firſt, before they come to any fit age for bearing, being one with another five years; but when they do begin, they bear in greater plenty than ſtone-fruit. 3. The ſtone-fruit, figs, and grapes, commonly bear conſiderably in three or four years, and bear full crops the fifth and ſixth years; and hold it for many years, if well ordered. 4. The fruit-trees in the ſame neighbourhood will ripen a fortnight ſooner in ſome grounds than in others of a different temperature. 5. That in the ſame country, hot or cold ſummers ſet conſiderably forwards, or put backwards, the ſame fruit. 6. That the fruit on wall-trees generally ripen before thoſe on ſtandards, and thoſe on ſtandards before thoſe on dwarfs. 7. That the fruit of all wall-trees planted in the ſouth and weſt quarters, commonly ripen about the ſame time, only thoſe on the ſouth rather earlier than thoſe in the eaſt; thoſe in the weſt are later by eight or ten days; and thoſe on the north, by 15 or 20. For the planting, pruning, grafting, &c. of fruit-trees, ſee the articles PLANTING, TRANSPLANTING, PRUNING, GRAFTING, ORCHARD, NURSERY, &c.

FRUITERY, a place for the keeping of fruit, a fruit-houſe, or fruit-loft.

A fruitery ſhould be inacceſſible to any thing of moiſture; and ſhould be as much as poſſible ſo, even to froſt.

FRUMENTACEOUS, a term applied by botaniſts to all ſuch plants as have a conformity with wheat, in reſpect of their fruits, leaves, ears, or the like.

FRUMENTARII, a kind of ſoldiers or archers under the weſtern empire.

The firſt time we read of theſe officers is in the reign of the emperor Adrian, who made uſe of them to inform himſelf of whatever paſſed. They did not make any particular corps diſtinct from the reſt of the forces, but there was a certain number of them in each legion. It is ſuppoſed, that they were at firſt a number of young perſons, diſpoſed by Auguſtus throughout the provinces, particularly on all the grand roads, to acquaint the emperor, with all expedition, of every thing that happened.

Afterwards they were incorporated into the troops themſelves, where they ſtill retained their ancient name. As their principal office was their giving intelligence, they were often joined with the curioſi, with whom they agreed in this part of their office.

Their name of *frumentarii* is derived from their being alſo a ſort of purveyors to the armies, cities, &c. collecting all the corn from the ſeveral provinces to furniſh the commonwealth.

FRUMENTATION, in Roman antiquity, a largeſs of corn beſtowed on the people. This practice of giving corn to the people was very ancient among the Romans, and frequently uſed to ſoothe the turbulent humour of the populace. At firſt the number of thoſe to whom this largeſs was given was indeterminate, till Auguſtus fixed it at 200,000.

FRUSH, or RUNNING-THRUSH. See FARRIERY. Sect. xliv.

FRUSTUM, in mathematics, a part of ſome ſolid body ſeparated from the reſt.

The fruſtum of a cone is the part that remains, when the top is cut off by a plane parallel to the baſe; and is otherwiſe called a *truncated cone*. See *CONIC Sections*.

The fruſtum of a pyramid is alſo what remains after the top is cut off by a plane parallel to its baſe.

The fruſtum of a globe or ſphere is any part thereof cut off by a plane, the ſolid contents of which may be found by this rule: To three times the ſquare of the ſemidiameter of the baſe add the ſquare of its height; then multiply that ſum by the height, and this product multiplied by .5236 gives the ſolidity of the fruſtum.

FRUTEX, a SHRUB. Shrubs, according to Linnæus, make a branch of the ſeventh family in the vegetable kingdom; and are diſtinguiſhed from trees, in that they come up without buds. But this diſtinction is not univerſal, though it be generally juſt with regard to thoſe of Europe. Nature hath made no abſolute diſtinction between trees and ſhrubs. *Frutex*, in its gereral acceptation, is a plant whoſe trunk is perennial, gemmiparous, woody, dividing and ſubdividing into a great number of branches. In ſhort, it is the epitome of a tree, exemplified in the roſe-buſh.

FRY, in zoology, ſignifies the ſpawn, or rather young, of fiſh.

FRYTH (John), a martyr to the Proteſtant religion in the reign of Henry VIII. He was the ſon of an inn-keeper at Seven-oaks in Kent; and educated in the king's college, Cambridge, where he took the degree of Batchelor of arts. Thence he removed to Oxford, and was made a junior canon of Wolſey's college. He had not been long in this univerſity before he became acquainted with William Tyndale, a zealous Lutheran, with whom he converſed frequently on the abuſes in religion. Fryth become a convert to Lutheraniſm, and publicly avowed his opinions. He was apprehended, examined by the commiſſary, and confined to his college. At length having obtained his liberty, in 1528 he went over to Germany, where he continued about two years; and then returned to England, more than ever determined in his religious ſentiments. Finding at that time but few aſſociates, he wandered about from place to place, till at laſt he was taken up at Reading as a vagrant, and ſet in the ſtocks, where he remained till he was near expiring for want of ſuſtenance. He was at length relieved by the humanity of Leonard Cox, a ſchoolmaſter; who finding him a man of letters, procured his enlargement, and adminiſtered to his neceſſities. Fryth now ſet out for London, where, with more zeal than prudence, he began to make proſelytes; but was ſoon apprehended by order of the chancellor Sir Thomas Moore, and ſent priſoner to the Tower. Refuſing to recant his opinions, he was condemned to the flames, and accordingly burnt in Smithfield, on the 4th of July 1533. He left ſeveral works behind him, which were printed in folio in 1573.

FUAGE, in old Engliſh writers, a tax of 12d. for every fire, levied in the time of Edward III.

FUCINUS LACUS (anc. geog.), a lake of Italy in the country of the Marſi. Now *Lago di Celano*, from a cognominal citadel, lying in the ſouth of the Abruzzo Ultra, in the kingdom of Naples, near the Apennine. This lake was under the protection of a god of the ſame denomination, whoſe temple ſtood on its banks. According to the teſtimony of ancient authors, it was ſubject to extraordinary riſings and decreaſings. The actual circumference is 47 miles: the breadth in the wideſt part is 10, in the narroweſt 4; its depth 12 feet upon an average. But all theſe have varied prodigiouſly. Two miles up the plain, behind Avezzano, the fragments of boats, ſhells, and other marks of its ancient extent, have been caſually diſcovered: and, on the contrary, there are people who remember when it did not flow nearer than within two miles of Avezzano. An immenſe tract of excellent land is loſt at every increaſe of its level. All round this noble piece of water riſes a circle of grand mountains, ſome of them the higheſt in Italy, if we except the Alps, and many of them covered with ſnow; and at the foot of them are numerous villages, with rich and well cultivated farms. The environs of the lake, Mr Swinburn deſcribes as all well-incloſed, and the ſides of the hills as covered with fine woods; its waters abound with fiſh of various kinds, and thither repair at ſtated ſeaſons innumerable flights of wild-fowl. As the ſwelling of the lake was attended with incredible damage, the Marſi had often petitioned the ſenate to drain it; Julius Cæſar would have attempted it, had he lived longer. His ſucceſſors were averſe to the project; till Claudius, who delighted in expenſive difficult enterpriſes, undertook it. During the ſpace of eleven years he employed 30,000 men in digging a paſſage through the mountain; and when every thing was ready for letting off the water, exhibited a ſuperb naval ſpectacle on the lake. A great number of condemned criminals were obliged to act the parts of Rhodians and Sicilians in ſeparate fleets, to engage in earneſt, and to deſtroy one another for the entertainment of the court and the multitude of ſpectators that covered the hills: A line of well-armed veſſels and rafts loaded with ſoldiers ſurrounded the ſcene of action, in order to prevent any of the wretches from eſcaping; but it was with great difficulty and many threats that they could be brought to an engagement. When this ſavage diverſion was ended, the operations for opening the emiſſary or outlet commenced, and the emperor was very near being ſwept away and drowned by the ſudden ruſhing of the waters towards his vent. However, either through the ignorance or negligence of the engineers, the work did not anſwer as was expected, and Claudius did not live long enough to have the faults amended: Nero abandoned the ſcheme through envy. Hadrian is ſaid to have let off the waters of the Fucinus; but none now eſcape except through hidden channels formed by nature, which are probably ſubject to be obſtructed, and thus occaſion a ſuperabundance of water in the lake, till ſome unknown cauſe removes the obſtructions and again gives free paſſage.

Sir William Hamilton, who viſited the Fucinus in 1785, ſays, "it is the moſt beautiful lake he ever ſaw, and would be complete if the neighbouring mountains were better wooded." It furniſhes abundance of fiſh, though not of the beſt quality. There are a few large trout, but moſtly tench, barbel, and dace. In the ſhallow water on the borders of the lake, he ſaw thouſands of water-ſnakes purſuing and preying upon a little kind of fiſh like thornbacks, but much better armed; though their defenſive weapons ſeemed to avail them but little againſt ſuch ravenous foes. Claudius's emiſſary he deſcribes as ſtill entire, though filled up with earth and rubbiſh in many parts. He went into it with torches as far as he could. It is a covered under ground canal three miles long, and part of it cut through a hard rock; and other parts ſupported by maſon work, with wells to give light. Hadrian is ſaid to have let off the waters of the lake: and our author is of opinion, that if the canal were cleared and repaired, it would ſtill anſwer that purpoſe, and thereby reſtore a great deal of rich land fit for cultivation.

FUCUS, a name given by the ancients to certain dyes and paints. By this name they called a purple ſea-plant uſed by them to dye woollen and linen things of that colour. The dye was very beautiful, but not laſting; for it ſoon began to change, and in time went wholly off. This is the account Theophraſtus gives of it.

The women of thoſe times alſo uſed ſomething called *fucus*, to ſtain their cheeks red; and many have ſuppoſed, from the ſame word expreſſing both, that the ſame ſubſtance was uſed on both occaſions. But this, on a ſtrict inquiry, proves not to be the caſe. The Greeks called every thing *fucus*, that would ſtain or paint the fleſh. But this peculiar ſubſtance uſed by the women to paint their cheeks was diſtinguiſhed from the others by the name of *rizion* among the more correct writers, and was indeed a root brought from Syria into Greece. The Latins, in imitation of the Greek name, called this root *radicula*, and Pliny very erroneouſly confounds the plant with the *radix lunaria*, or *ſtruthion* of the Greeks.

The word *fucus* was in thoſe times become ſuch an univerſal name for paint, that the Greeks and Romans had a *fucus metallicus*, which was the ceruſs uſed for painting the neck and arms white: after which they uſed the *purpuriſſum*, or red fucus of the *rizium*, to give the colour to the cheeks. In after-times they alſo uſed a peculiar *fucus* or paint for the purpoſe, prepared of the *Creta argentaria*, or ſilver-chalk, and ſome of the rich purple dyes that were in uſe at that time: and this ſeems to have been very little different from our roſe-pink; a colour commonly ſold at the colour-ſhops, and uſed on like occaſions.

Fucus, in the Linnæan ſyſtem of botany, is a genus of the order of algæ, belonging to the cryptogamia claſs of plants. The moſt remarkable ſpecies are,

1. The ſerratus, ſerrated fucus, or ſea-wrack. This is frequent at all ſeaſons of the year upon the rocks at low-water mark, but produces its ſeeds in July and Auguſt. It conſiſts of a flat, radical, and dichotomous leaf, about two feet long; the branches half an inch wide, ſerrated on the edges with dents of unequal ſize, and at unequal diſtances, having a flat ſtalk or rib divided like the leaf, and running in the middle of it through all its various ramifications. A ſmall ſpecies of coralline called by Linnæus *Sertularia pumila*, frequently creeps along the leaf. All the ſpecies of fucus afford a quantity of impure alkaline ſalt; but this much leſs than ſome others; eight ounces of the aſhes yielding only three of fixed ſalt. The Dutch cover their crabs and lobſters with this fucus to keep them alive and moiſt; and prefer it to any other, as being deſtitute of thoſe mucous veſicles with which ſome of the reſt abound, and which would ſooner ferment and become putrid.

2. The veſiculoſus, bladder fucus, common ſea-wrack, or ſea-ware. It grows in great abundance on the ſea-rocks about low-water mark; producing its fructifications in July and Auguſt. It has the ſame habit, colour, and ſubſtance as the foregoing; but differs from it in the following reſpects: The edges of the leaf have no ſerratures, but are quite entire. In the diſc or ſurface are immerſed hollow, ſpherical, or oval air-bladders, hairy within, growing generally in pairs, but often ſingle in the angle of the branches, which are moſt probably air-bladders deſtined to buoy up the plant in the water. Laſtly, on the ſummits or extreme ſegments of the leaves, appear tumid veſicles about three quarters of an inch long, ſometimes oval and in pairs, ſometimes ſingle and bifid, with a clear viſcid mucus interſperſed with downy hairs.—This ſpecies is an excellent manure for land; for which purpoſe it is often applied in the maritime parts of Scotland and other countries. In the iſlands of Jura and Skye it frequently ſerves as a winter-food for cattle, which regularly come down to the ſhores at the receſs of the tides to ſeek for it. And ſometimes even the ſtags have been obſerved, after a ſtorm, to deſcend from the mountains to the ſea-ſides to feed upon this plant.

Linnæus informs us, that the inhabitants of Gothland in Sweden boil this fucus in water, and mixing therewith a little coarſe meal or flour, feed their hogs with it; for which reaſon they call the plant *ſwintang*. And in Scania, he ſays, the poor people cover their cottages with it, and ſometimes uſe it for fuel.

In Jura, and ſome other of the Hebrides, the inhatants dry their cheeſes without ſalt, by covering them with the aſhes of this plant: which abounds with ſuch quantity of ſalts, that from five ounces of the aſhes may be procured two ounces and a half of fixed alkaline ſalts, that is, half of their whole weight.

But the moſt beneficial uſe to which the fucus veſiculoſus is applied, in the way of economy, is in making pot-aſh or kelp, a work much practiſed in the Weſtern Iſles. There is great difference in the goodneſs and price of this commodity, and much care and ſkill required in properly making it. That is eſteemed the beſt which is hardeſt, fineſt grained, and free from ſand or earth. The price of kelp in Jura is 3l. 10s. *per* ton, and about 40 or 50 tons are exported annually from that iſland. So great a value is ſet upon this fucus by the inhabitants of that place, that they have ſometimes thought it worth their while to roll fragments of rocks and huge ſtones into the ſea, in order to invite the growth of it.

Its virtues in the medical way have been much celebrated by Dr Ruſſel, in his Diſſertation concerning the uſe of Sea-water in the Diſeaſes of the Glands. He found the ſaponaceous liquor or mucus in the veſicles of this plant to be an excellent reſolvent, extremely ſerviceable in diſperſing all ſcorbutic and ſcrophulous ſwellings of the glands. He recommends the patient to rub the tumor with theſe veſicles bruiſed in his hand, till the mucus has thoroughly penetrated the part, and afterwards to waſh with ſea-water. Or otherwiſe, to gather two pounds of the tumid veſicles, in the month of July, when they are full of mucus, and infuſe them in a quart of ſea-water, in a glaſs-veſſel, for the ſpace of 15 days, when the liquor will have acquired nearly the conſiſtence of honey. Then ſtrain it off through a linen cloth, and rub this liqour with the hand, as before, three or four times a-day, upon any hard or ſcrophulous ſwellings, waſhing the parts afterwards with ſea-water, and nothing can be more efficacious to diſperſe them. Even ſcirrhoſities. he ſays, in womens breaſts, have been diſpelled by this treatment. The ſame author, by calcining the plant in the open air, made a very black ſalt-powder, which he called *vegetable æthiops*; a medicine much in uſe as a reſolvent and deobſtruent, and recommended alſo as an excellent dentrifice, to correct the ſcorbutic laxity of the gums, and take off the foulneſs of the teeth.

3. The plicatus, matted or Indian-graſs fucus, grows on the ſea-ſhores in many places both of Scotland and England. It is generally about three or four, but ſometimes ſix, inches long. Its colour, after being expoſed to the ſun and air, is yellowiſh, or auburn: its ſubſtance pellucid, tough, and horny, ſo as to bear a ſtrong reſemblance to what the anglers call *Indian graſs*, that is, the tendrils iſſuing from the ovary of the dog-fiſh.

4. The palmatus, palmated or ſweet fucus, commonly called *dulſe* or *dilſe*. This grows plentifully on the ſea-coaſts of Scotland, and the adjoining iſlands. Its ſubſtance is membranaceous, thin, and pellucid; the colour red, ſometimes green with a little mixture of red; its length generally about five or ſix inches, but varies from three inches to a foot; its manner of growth fan-ſhaped, or gradually dilated from the baſe upwards. Its diviſions are extremely various. The inhabitants both of Scotland and England take pleaſure in eating this plant, without expecting any medical virtues from it. The inhabitants of the Archipelago alſo are fond of it, as we learn from Steller. They ſometimes eat it raw, but eſteem it moſt when added to ragouts, oglios, &c. to which it gives a red colour; and, diſſolving, renders them thick and gelatinous. In the Iſle of Skye it is ſometimes uſed in fevers to promote a ſweat, being boiled in water with the addition of a little butter. In this manner it alſo frequently purges. The dried leaves, infuſed in water, exhale the ſcent of violets.

5. The eſculentus, eatable fucus, or bladder-locks, commonly called *tangle* in Scotland, is likewiſe a native of the Britiſh ſhores. It is commonly about four feet long, and ſeven or eight inches wide; but is ſometimes found three yards or more in length, and a foot in width. Small ſpecimens are not above a cubit long, and two inches broad. The ſubſtance is thin, membranaceous, and pellucid; the colour green or olive. The root conſiſts of tough cartilaginous fibres. The ſtalk is about ſix inches long and half an inch wide, nearly ſquare, and pinnated in the middle between the root and origin of the leaf, with ten or a dozen pair of thick, cartilaginous, oval-obtuſe, foliaceous ligaments, each about two inches long, and crowded together. The leaf is of an oval-lanceolate, or long elliptic form, ſimple and undivided, waved on the edges, and widely ribbed in the middle from bottom to top, the ſtalk running through its whole length, and ſtanding out on both ſides of the leaf. This fucus is eaten in the north both by men and cattle. Its proper ſeaſon is in the month of September, when it is in greateſt perfection. The membranous part is rejected, and the ſtalk only is eaten. It is recommended in the diſorder called *pica*, to ſtrengthen the ſtomach and reſtore the appetite.

6. The ſaccharinus, ſweet fucus, or ſea-belt, is very common on the ſea-coaſt. The ſubſtance of this is cartilaginous and leathern; and the leaf is quite ribleſs. By theſe characters it is diſtinguiſhed from the preceding, to which it is nearly allied. It conſiſts only of one ſimple, linear, elliptic leaf, of a tawney green colour, about five feet long and three inches wide in its full-grown ſtate; but varies ſo exceedingly as to be found from a foot to four yards in length. The ordinary length of the ſtalk is two inches, but it varies even to a foot. The root is compoſed of branched fibres, which adhere to the ſtones like claws. This plant is often infeſted with the ſertularia ciliata. The inhabitants of Iceland make a kind of pottage of this fucus; boiling it in milk, and eating it with a ſpoon. They alſo ſoak it in freſh water, dry it in the ſun, and then lay it up in wooden veſſels, where in a ſhort time it is covered with a white effloreſcence of ſea-ſalt, which has a ſweet taſte like ſugar. This they eat with butter; but if taken in too great a quantity, the ſalt is apt to irritate the bowels and bring on a purging. Their cattle feed and get fat upon this plant, both in its recent and dry ſtate; but their fleſh acquires a bad flavour. It is ſometimes eaten by the common people on the coaſt of England, being boiled as a pot-herb.

7. The ciliatus, ciliated or ligulated fucus, is found on the ſhores of Iona and other places, but is not common. The colour of this is red, the ſubſtance membranous and pellucid, without rib or nerve; the ordinary height of the whole plant about four or five inches. It is variable in its appearance, according to the different ſtages of its growth. This fucus is eaten by the Scots and Iriſh promiſcuouſly with the fucus palmatus or dilſe.

8. The prolifer, or proliferous fucus, is found on the ſhores of the weſtern coaſt, adhering to ſhells and ſtones. The colour is red; the ſubſtance membranaceous, but tough, and ſomewhat cartilaginous, without rib or nerve, though thicker in the middle than at the edges. The whole length of the plant is about four or five inches, the breadth of each leaf about a quarter of an inch. The growth of this fucus, when examined with attention, appears to be extremely ſingular and wonderful. It takes its origin either from a ſimple, entire, narrow, elliptic leaf, about an inch and a half long; or from a dilated forked one, of the ſame length. Near the extremity of the elliptic leaf, or the points of the forked one (but out of the ſurface, and not the edge), ariſes one or more elliptic or forked leaves, which produce other ſimilar ones, in the ſame manner, near the ſummits; and ſo on continually one or more leaves from near the ends of each other, in a proliferous and dichotomous order, to the top of the plant; which in the manner of its growth reſembles in a good meaſure the cactus opuntia, or flat-leaved Indian-fig. Sometimes two or three leaves, or more, grow out of the middle of the diſc of another leaf; but this is not the common order of their growth. The fructifications are red, ſpherical, rough warts, leſs than the ſmalleſt pin's head, ſcattered without order on the ſurface of the leaves. Theſe warts when highly magnified, appear to be the curled rudiments of young leaves; which in due time either drop off and form new plants, or continue on and germinate upon the parent. This plant is very much infeſted with the fluſtra piloſa, the mandrepora verrucaria, and other corallines, which make it appear as if covered with white ſcabs.

9. The pinnatifidus, jagged fucus, or pepper-dilſe, is frequent on ſea-rocks which are covered by the tides; both on the eaſtern and weſtern coaſts. It is of a yellow olive-colour, often tinged with red. The ſubſtance is cartilaginous, but yet tender and tranſparent; the height about two or three inches. This fu-

cus has a hot taſte in the mouth, and is therefore called *pepper-dilſe* by the people in Scotland, who frequently eat it as a ſalad in the ſame manner they do the fucus palmatus.

10. The plocamium, or pectinated fucus, is frequent on the ſea-rocks, and in baſins of water left by the receſs of the tides. Its natural colour is a moſt beautiful bright red or purple, but is often variegated with white or yellow. Its ſubſtance is cartilaginous, but extremely thin, delicate, and tranſparent; its height commonly about three or four inches. The ſtalk is compreſſed, about half a line in diameter, erect, but waved in its growth, and divided almoſt from the baſe into many widely expanded branches. Theſe primary branches are very long, alternate, exactly like the ſtalk, and ſubdivided into alternate ſecondary branches, which are again frequently compounded in like manner, and theſe diviſions decorated with ſubulated teeth growing in alternate rows, curiouſly pectinated or finely toothed on the upper ſide like a comb, the ſmalleſt of theſe teeth ſcarcely viſible to the naked eye. The fructifications are minute ſpherical capſules, or ſmooth dark-red globules, ſcattered without order on the ſides of the branches; generally ſeſſile, but ſome few of them ſupported on ſhort peduncles. This fucus, on account of its elegant colours and fine diviſions, is the ſpecies moſt admired by the ladies who are fond of pictures and mimic landſcapes compoſed of marine vegetables.

11. The filum, thread-fucus, or ſea-laces, is found on the ſea-rocks, and waving under the water like long ſtrings, frequent on many parts of the coaſt. The ſubſtance of this is opaque and cartilaginous, but not difficult to be broken. The colour, when recent, a dull olive-green; when dry, fuſcous, or nearly black; and when expoſed for ſome time on the ſhores to the ſun and air, it becomes yellow, ſtraw-coloured, or white. It conſiſts only of a ſimple, unbranched, naked cylindrical ſtalk, three or four yards long, more or leſs, from the ſize of a large fiddle-ſtring to that of a thick whip cord; ſmalleſt at the baſe and ſummit; ſmooth on the outſide, full of mucus within; often twiſted, and always intercepted by numerous tranſverſe diaphragms, viſible when the plant is held between the eye and the light. The fructifications have not yet been diſcovered; but from the tranſverſe ſepta in its ſtructure, it is reaſonable to ſuppoſe this plant to belong rather of the genus of conferva than that of fucus. The ſtalks, ſkinned when half dry and twiſted, acquire ſo conſiderably a degree of ſtrength and toughneſs, that we are informed the Highlanders ſometimes uſe them for the ſame intentions as Indian graſs.

12. The giganteus, or gigantic fucus, is a native of the Straits Le Maire; and grows on rocky ground, which in ſome countries is diſtinguiſhed from ſand or ooze by the enormous length of the ſea-weeds that grow upon it. The leaves are four feet long, and ſome of the ſtalks, though not thicker than a man's thumb, are 120. Sir Joſeph Banks and Dr Solander ſounded over ſome of them which were 84 feet long; and as they made a very acute angle with the bottom, they were thought to be at leaſt one half longer.

FUEGO, or Foga, one of the Cape de Verd Iſlands, in the Atlantic ocean. It is much higher than any of the reſt; and ſeems, at ſea, to be one ſingle mountain, though on the ſides there are deep valleys. There is a volcano at the top, which burns continually, and may be ſeen a great way off at ſea. It vomits a great deal of fire and ſmoke, and throws out huge pieces of rock to a vaſt height; and ſometimes torrents of melted matter run down the ſides. The Portugueſe, who firſt inhabited it, brought negro ſlaves with them, and a ſtock of cows, horſes, and hogs; but the chief inhabitants now are blacks, of the Romiſh religion. W. Long. 24. 47. N. Lat. 15. 20.

FUEL, whatever is proper to burn or make a fire; as wood, turf, peat, bituminous earths, coal, &c.

FUEN-hoa, a city of China, in the province of Pe-tcheli, celebrated for its extent and the number of its inhabitants, as well as for the beauty of its ſtreets and triumphal arches. It is ſituated near the great wall, amidſt mountains; and has under its juriſdiction, beſides two cities of the ſecond and eight of the third claſs, a great number of fortreſſes, which bar the entrance of China againſt the Tartars.

FUGALIA, in Roman antiquity, a feaſt ſuppoſed by ſome to be the ſame with the *refugium*, held on 24th of February, in memory of the expulſion of the kings and the aboliſhing of monarchical government. Others again diſtinguiſh the fugalia from the regifuge. And others think, that the fugalia was the ſame with the *poplifugia*, or the feaſt of Fugia, the goddeſs of joy, occaſioned by the rout of an enemy, which was the reaſon the people abandoned themſelves to riot and debauchery.

FUGITIVE, a perſon obliged to fly his country, or remove from a place where he had ſome abode or eſtabliſhment, on account of his crimes, debts, or other occaſions.

Fugitive Pieces, among the learned, denote thoſe little compoſitions which are printed on looſe ſheets or half ſheets; thus called, becauſe eaſily loſt and ſoon forgot.

FUGUE, in muſic, (from the Latin *fuga*, "a chaſe:") A piece of muſic, ſometimes longer and ſometimes ſhorter, in which, agreeable to the rules of harmony and modulation, the compoſer treats a ſubject; or, in other words, what expreſſes the capital thought or ſentiment of the piece, in cauſing it to paſs ſucceſſively and alternately from one part to another.

Theſe are the principle rules of the fugue; of which ſome are peculiar to itſelf, and others common to it with what the French call *imitation.*

1. The ſubject proceeds from the tonic to the dominant, or from the dominant to the tonic, in riſing or deſcending.

2. Every fugue finds its reſponſe in the part immediately following that which commenced.

3. That reponſe ought to reſume the ſubject in the interval of a fourth or fifth above or below the key, and to purſue it as exactly as the laws of harmony will admit; proceeding from the dominant to the tonic when the ſubject is introduced from the tonic to the dominant, and moving in a contrary direction when the ſubject is introduced from the dominant to the tonic. One part may likewiſe reſume the ſame ſubject in the octave or uniſon of the preceding; but in that caſe, it is a repetition rather than a real reſponſe.

4. As the octave is divided into two unequal parts, of which the one contains four gradations aſcending from the tonic to the dominant, and the other only

three in continuing the aſcent from the dominant to the tonic; this renders it neceſſary to have ſome regard to this change in the expreſſion of the ſubject, and to make ſome alterations in the reſponſe, that we may not quit the chords that are eſſential to the mode. It is a different caſe when the compoſer intends to alter the modulation; for there the exactneſs of the reſponſe itſelf, when taken in a different tone, produces the alteration proper for this change.

5. It is neceſſary that the fugue ſhould be planned in ſuch a manner, that the reſponſe may commence before the cloſe of the firſt air, ſo that both the one and the other may be in part heard at the ſame time; that, by this anticipation, the ſubject may be as it were connected with itſelf, and that the art of the compoſer may diſcover itſelf in this concourſe. It is abſolute mockery, inſtead of a fugue, to impoſe upon the hearers the ſame air, merely tranſpoſed from one key to another, without any other reſtraint than an accompaniment afterwards formed at pleaſure. This deſerves at beſt no better name than what the French call *imitation*. See IMITATION.

Beſides the rules, which are fundamental, there are others which, though preſcribed by taſte alone, are not leſs eſſential. Fugues, in general, render muſic more noiſy than agreeable; it is for this reaſon that they are more agreeable in the chorus than any where elſe. Now, as their chief merit conſiſts in fixing the ear on the principal air or ſubject, which for this reaſon is made to paſs inceſſantly from part to part, and from mode to mode, the compoſer ought to exert his care in preſerving that air always diſtinct; or to prevent it from being abſorbed in, or confounded with, the other parts. To produce this effect, there are two different ways: one in the movement, which muſt be inceſſantly contraſted with itſelf; ſo that, if the procedure of the fugue be accelerated, the other parts more gravely and with protracted notes; or, on the contrary, if the motion of the fugue be ſlow and ſolemn, the accompaniments muſt have more and quicker buſineſs. The other method is to extend the harmony, by removing the parts at a greater diſtance one from the other; leſt the others, too nearly approximated to that which contains the ſubject, ſhould be confounded with it, and prevent it from being diſtinguiſhed with ſufficient clearneſs; ſo that what would be an imperfection any where elſe, becomes here a beauty.

The unity of melody ſhould be preſerved: that is the great and general rule, which muſt frequently be practiſed by different means. The chords muſt be choſen, and the intervals, ſo that one particular ſound may produce the chief effect: this can only reſult from the unity of the melody. It will ſometimes be neceſſary to employ voices and inſtruments of different kinds, that the part which ought to prevail may be moſt eaſily diſtinguiſhed: this again ſhows the neceſſity of preſerving the unity of the melody. Another object of attention, no leſs neceſſary, is, in the different connections of modulation which are introduced by the procedure and progreſs of the fugue, to cauſe all theſe modulations to correſpond at the ſame time in all the parts, to connect the whole in its progreſs by an exact conformity of modes; leſt, if one part be in one mode, and another in another, the general harmony ſhould be in none at all, and for that reaſon ſhould no longer be able to produce ſimple effects upon the ear, nor ſimple ideas in the mind; which is another reaſon for preſerving unity of melody. In a word in every fugue the confuſion of melodies and modulations is at once what a compoſer has moſt to fear, and will find the greateſt difficulty in avoiding; and as this kind of muſic never produces a pleaſure above mediocrity one may ſay that a fine fugue is, though the maſter piece of an excellent harmoniſt, ungrateful to his toils.

There are ſtill ſeveral other kinds of fugues; ſuch as the perpetual fugue*, the double fugue, the inverted fugue.

The inverted fugue is a manner of compoſition, in which the flying part proceeds in a contrary direction to the other fugue, which had been formerly fixed in the ſame piece of muſic. Thus, when the firſt fugitive part is heard in aſcending from the tonic to the dominant, or from the dominant to the tonic, the counter fugue ought to be heard in deſcending from the dominant to the tonic, or from the tonic to the dominant, and *vice verſa*. Its other rules are exactly like thoſe of the common fugue.

FULCRUM, in mechanics, the prop or ſupport by which a lever is ſuſtained.

FULDE, a conſiderable town of Germany, in the circle of the upper Rhine, and in Buchow, with a celebrated abbey; whoſe abbot is primate of the abbeys of the empire, perpetual chancellor of the emperor, and ſovereign of a ſmall territory lying between Heſſe, Franconia, and Thuringia. It is ſeated on the river Fulde, 55 miles ſouth of Caſſel, and 58 north-eaſt of Francfort. E. Long. 9. 53. N. Lat. 50. 40.

FULGORA, in zoology, a genus of inſects belonging to the order of hemiptera; the characters of which are theſe: The front, or fore-part of the head, is drawn extended and empty; the antennæ are ſeated below the eyes, having two articulations, whereof the exterior is larger, and of a globular form: the roſtrum is inflected, or bent inwards under the body; and the feet are made for walking. There are nine ſpecies, the moſt remarkable of which is the candelaria, or lantern-fly. The head and thorax are generally of a ruddy brown; and the ground colour of the elytra is freſh green, but quaintly figured with ſpots of a yellowiſh clay colour, ſometimes pale, at other ſeaſons of a deeper hue. The wings are of a deep and beautiful yellow, with a broad band of gloſſy black bordering the extremities. The tarſi of the feet are compoſed of three articulations, and are of a paler colour than the legs and thighs, which are brown. When the inſect is on the wing, the waving of the elytra (whoſe thinneſs renders the ſpots thereon tranſparent), aſſiſted by the luminous quality peculiar to the tribe, and the golden yellow of the under wings, bordered with black, occaſion, in Mr Barbut's opinion, the flaſhes they dart around in the night, and create images beyond probability in the minds of perſons too ready to credit hyperboles. It is an inhabitant of China.

FULHAM, a village of Middleſex, four miles from London. The Danes in 869 wintered at this place till they retired to the continent. It was in the Conqueror's time held of the king by the canons of St Paul's; and there is an ancient houſe here, which is moated about, and belongs to the ſee of London, whoſe biſhop has a palace here, and the demeſne, has belonged ed to that dioceſe from 1067. From this place to Putney there is a wooden bridge over the Thames, where not only horſes, coaches, and all carriages, but even foot paſſengers, pay toll. The church here is both a rectory and a vicarage.

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* See *Canon*.

FULICA, the GALLINULE and COOT, in ornithology; a genus of birds of the order of grallæ. It has a convex bill, with the upper mandible fornicated over the lower at the edge; the lower mandible is gibbous behind the tip. The forehead is bald; and the feet have four toes ſubpinnated. There are 25 ſpecies; 18 of which belong to the gallinule diviſion, diſtinguiſhed by having the toes furniſhed with broad ſcalloped membranes; and 7 comprehend the coots which have the toes divided to their origin. The following ſpecies are among the moſt noted.

1. The *chloropus*, or COMMON GALLINULE, is in length about 14 inches, and has a bald forehead and broad flat toes. It gets its food on graſſy banks, and borders near freſh waters, and in the very waters if they be weedy. It builds upon low trees and ſhrubs by the water-ſide; breeding twice or thrice in a ſummer, and, when the young are grown up, drives them away to ſhift for themſelves. They lay ſeven eggs of a dirty white, thinly ſpotted with ruſt-colour. This bird ſtrikes with its bill like a hen, and in the ſpring has a ſhrill call. In flying, it hangs down its legs; in running, it often flirts up its tail, and ſhows the white feathers. We may obſerve, that the bottoms of its toes are ſo very flat and broad (to enable it to ſwim), that it ſeems to be the bird which connects the cloven-footed aquatics with the next tribe, *viz.* the fin-toed. It is pretty common on the continent, though in ſome parts more ſcarce than in others. It is alſo an inhabitant of America, from New York to Carolina; and is recorded as a native of Jamaica and other iſlands in the Weſt Indies. It is ſaid to feed on plants and ſmall fiſh; and the fleſh is for the moſt part pretty good.

2. The *porphyrio*, or PURPLE GALLINULE, is about the ſize of a fowl, or 17 inches in length. The bill is an inch and an half long, and of a deep red colour. The forehead is bare and red; the head and hind part of the neck are gloſſy violet: the legs are very ſtout, and of the colour of the bill. This bird is more or leſs common in all the warmer parts of the globe. On the coaſts of Barbary they abound, as well as in ſome of the iſlands of the Mediterranean. In Sicily they are bred in plenty, and kept for their beauty; but whether indigenous there, is uncertain. It is frequently met with in various parts of the South of Ruſſia and weſtern parts of Siberia, among reedy places; in the neighbourhood of the Caſpian Sea it is not uncommon; but in the cultivated rice-grounds of Ghilar in Perſia it is in great plenty and high plumage. The female makes the neſt among the reeds in the middle of March; lays three or four eggs, and ſits from three to four weeks. That it is common in China, the paper-hangings from thence will every where teſtify. It is alſo met with in the Eaſt Indies, the iſlands of Java, Madagaſcar, and many others. The late navigators ſaw them at Tongataboo in vaſt numbers, as well as in the iſland of Tanna and other parts. It is alſo common in the ſouthern parts of America. In reſpect to is manners, is a very docile bird, being eaſily tamed, and feeding with the poultry, ſcratching the ground with the foot as the cock and hen. It will feed on many things, ſuch as fruit, roots of plants, and grain; and will eat fiſh with avidity, dipping them into the water before it ſwallows them. It will frequently ſtand on one leg, and lift the food to its mouth with the other like a parrot. A pair of theſe kept in an aviary in France, made a neſt of ſmall ſticks mixed with a quantity of ſtraw, and laid ſix white eggs, perfectly round; but the hen was careleſs of them, and they came to nothing. The fleſh is ſaid to be exquiſite in taſte.

3. The *atra*, or COMMON COOT, hath a bald forehead, a black body, and lobated toes; and is about 15 inches in length. They frequent lakes and ſtill rivers; making their neſt among the ruſhes, with graſs, reeds, &c. floating on the water, ſo as to riſe and fall with it. They lay five or ſix large eggs, of a dirty whitiſh hue, ſprinkled over with minute deep ruſt-coloured ſpots; and it is ſaid that ſometimes they will lay 14 or more eggs. The young when juſt hatched are very deformed and the head mixed with a red coarſe down. In winter they often repair to the ſea, and the channel near Southampton, England, is ſometimes obſerved almoſt covered with them. They are often brought to that market, where they are expoſed to ſale without their feathers, and ſcalded like pigs. This ſpecies is not ſo numerous as might be expected; for we find that vaſt numbers fall a prey while young to the buzzards, which frequent the marſhes. Their food is ſmall fiſh and water-inſects: but they will ſometimes eat the roots of the bulruſh, and with it feed the young; they are ſaid likewiſe to eat grain. This ſpecies is ſuppoſed to extend throughout the old continent, and perhaps the new alſo. Authors record it as inhabiting Greenland, Sweden, Norway, Ruſſia, Siberia, Perſia, and China, and many of the intermediate parts. It is alſo met with in Jamaica, Carolina, and other parts of North America. The Indians about Niagara dreſs the ſkins of theſe birds, and uſe them for pouches. They are called in Carolina *fluſterers*.

4. The *aterrima*, or GREATER COOT, is of a lager ſize than the laſt, and its plumage is blacker. This ſpecies is ſaid to be found in Lancaſhire and Scotland: but is more plentiful on the continent, being found in Ruſſia and the weſtern part of Siberia very common; and is alſo in plenty at Sologne and the neighbouring parts, where they call it *judelle*. The people eat this bird on maigre days, and its fleſh is much eſteemed.

FULIGINOUS, whatever proceeds from a thick ſooty ſmoke, ſuch as litharge and lamp black.

FULIGNO, a city of Italy, in the pope's territories, 10 miles north of Spoletto.

FULIGO, in natural hiſtory, a ſpecies of pumice-ſtone. See PUMICE.

FULK (William), a learned and eminent divine of the church of England, in the 16th century. He was patroniſed by the earl of Leiceſter, who in 1571 preſented him to the living of Warley in Eſſex, and ſoon after to that of Diddington in Suffolk. He attended Leiceſter, when he went ambaſſador to France; and on his return was made maſter of Pembroke-hall, and Margaret profeſſor of divinity at Cambrige. His works are very numerous, levelled chiefly at the Papiſts, the moſt conſiderable of them is his Comment on the Rhemiſh Teſtament. He died in 1589.

FULLER (Nicholas), prebendary of Saliſbury, and a learned Engliſh critic; who publiſhed in 1617 *Miſcellanea Theologica* in four books, and afterward two more of *Miſcellanea Sacra*. He died in 1623; and there are ſome MSS of his remaining in the Bodleian library, that ſhow his great ſkill in Hebrew and philology.

Fuller (Dr Thomas), a learned Engliſh divine, was born at Alvinckle, near Oundle, in Northamptonſhire, about the year 1608, and ſtudied at Cambridge. He was choſen miniſter of St Bennet's there; and at about 23 years of age, his merit procured him fellowſhip in Sidney-college, and a prebend in Saliſbury cathedral. He was ſoon after preſented to the rectory of Broad Windſor in Dorſetſhire; and afterwards was made lecturer of the Savoy in London: but upon the preſſing of the covenant, he retired to Oxford; and ſoon after accompanied Sir Ralph Hopton as his chaplain in the army, which he attended in their marches from place to place. After the death of king Charles I. he obtained the living of Waltham-abbey, and was appointed lecturer of St Clement's; and ſhortly after removed to the lecture of St Bride's, Fleet-ſtreet. Upon the reſtoration, he recovered his prebend in the cathedral of Saliſbury, was appointed chaplain extraordinary to his majeſty, and created doctor of divinity. It is ſaid, his memory was ſo amazingly tenacious and comprehenſive, that he could make uſe of a ſermon *verbatim* if he once heard it. He once undertook, in paſſing to and from Temple-bar to the Poultry, to tell at his return every ſign as it ſtood in order on both ſides of the way, repeating them either backwards or forwards; and this taſk he actually performed. He wrote, 1. A Hiſtory of the Holy War. 2. The Church-hiſtory of Britain, in folio. 3. Andronicus, or the Unfortunate Politican, in 8vo. 4. A Piſgah-ſight of Paleſtine. 5. A Hiſtory of Engliſh Worthies; and other works. He died in Auguſt 1661; and was interred in the chancel of Cranford church, in Middleſex, whither his body was attended by at leaſt 200 of his brethren of the miniſtry.

FULLER, a workman employed in the woollen manufactories to mill or ſcour cloths, ſerges, and other ſtuffs, in order to render them more thick, compact, and durable. See FULLING.

FULLER's Earth, in natural hiſtory, a ſpecies of clay*, of a greyiſh aſh-coloured brown, in all degrees from very pale to almoſt black, and it has generally ſomething of a greeniſh caſt. It is very hard and firm, of a compact texture, of a rough and ſomewhat duſty ſurface that adheres ſlightly to the tongue. It is very ſoft to the touch, not ſtaining the hands, nor breaking eaſily between the fingers. It has a little harſhneſs between the teeth, and melts freely in the mouth. Thrown into water, it makes no ebullition or hiſſing; but ſwells gradually in bulk, and falls into a fine ſoft powder. It makes no efferveſcence with aquafortis.

The greateſt quantity and the fineſt earth of this kind in the world, is dug in the pits at Wavedon, near Woburn in Bedfordſhire. The ſtrata in theſe pits lie thus: From the ſurface to the depth of ſix feet, there are ſeveral layers or beds of ſand, all reddiſh, but ſome lighter coloured than others. Under theſe there is a thin ſtratum of ſand-ſtone, which they break through, and then there is the fuller's earth. The upper ſtratum of this is about a foot thick: the workmen call it *cledge*, and throw it aſide as uſeleſs; being commonly fouled with the ſand which originally covered it, and which inſinuates itſelf a good way into it. After this, they come to the fine fuller's earth for ſale, which lies to the depth of eight feet more. The matter of this is divided into ſeveral layers, their being commonly about a foot and an half between one horizontal fiſſure and another. Of theſe ſeveral layers, the upper half, where the earth breaks itſelf, is tinged red; which ſeems to be owing to the running of the water upon it from among the ſands above; ſome of which are probably of a ferruginous nature, or have ferruginous matter among them. This reddiſh fuller's earth the workmen call *crop*; and between the cledge and this there is a thin ſtratum of matter, of leſs than an inch, which in taſte, colour, and external appearance, reſembles the terra Japonica of the ſhops. The lower half of the ſtrata of fuller's earth they call *wall-earth*. This is untinged with the red colour of the other, and ſeems the moſt proper for fulling. Under the fuller's earth there is a ſtratum of white and coarſe ſtone about two feet thick. They ſeldom dig through this; but if they do, they find more ſtrata of ſand.

This earth is of great uſe in ſcouring cloths, ſtuffs, &c. imbibing all the greaſe and oil uſed in preparing, dreſſing, &c. of the wool; for which reaſon it is made a contraband commodity, and is not to be exported under the penalty of 1 s. for every pound weight. See FULLING.

FULLER's Weed, or *Teazle*. See DIPSACUS.

FULLERY, a place where cloths, &c. are fulled. See the next article.

FULLING, the art or act of cleanſing, ſcouring, and preſſing cloths, ſtuffs, and ſtockings, to render them ſtronger, cloſer, and firmer: called alſo *milling*. Pliny (*lib.* vii. cap. 56.) aſſures, that one Nicias, the ſon of Hermias, was the firſt inventor of the art of fulling: and it appears by an inſcription, quoted by Sir G. Wheeler, in his Travels thro' Greece, that this ſame Nicias was a governor in Greece in the time of the Romans.

The fulling of cloths and other ſtuffs is performed by a kind of water-mill, thence called a *fulling* or *ſcouring-mill*.

Theſe mills, excepting in what relates to the mill-ſtones and hopper, are much the ſame with corn-mills: and there are even ſome which ſerve indifferently for either uſe; corn being ground, and cloths fulled, by the motion of the ſame wheel. Whence, in ſome places, particularly in France, the fullers are called *millers*; as grinding corn and milling ſtuffs at the ſame time.

The principal parts of the fulling-mill are, The wheel, with its trundle; which gives motion to the tree or ſpindle, whoſe teeth communicate it to the peſtles or ſtampers, which are hereby raiſed and made to fall alternately according as its teeth catch on or quit a kind of latch in the middle of each peſtle. The peſtles and troughs are of woods; each trough having at leaſt two, ſometimes three peſtles, at the diſcretion of the maſter, or according to the force of the ſtream of water. In theſe troughs are laid the cloths, ſtuffs, &c. intended to be fulled: then, letting the current of water fall on the wheel, the peſtles are ſucceſſively let fall thereon, and by their weight and velocity ſtamp and preſs the ſtuffs very ſtrongly, which by this means become thickened and condenſed. In the courſe of the operation, they ſometimes make uſe of urine, ſometimes of fuller's earth, and ſometimes of ſoap. To prepare the ſtuffs to receive the firſt impreſſions of the peſtle, they are uſually laid in urine; then in fuller's earth and water; and, laſtly, in ſoap diſſolved in hot water. Soap alone would do very well; but this is expenſive: though fuller's earth, in the way of our dreſſing, is ſcare inferior thereto; but then it muſt be well cleared of all ſtones and grittineſs, which are apt to make holes in the ſtuff. As to urine, it is certainly prejudicial, and ought to be entirely diſcarded; not ſo much on account of its ill ſmell, as of its ſharpneſs and ſaltneſs, which qualities are apt to render the ſtuffs dry and harſh.

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* See *Clay*, n° 4.

The true method of fulling with ſoap is delivered by Monſ. Colinet, in an authentic memoir on that ſubject, ſupported by experiments made by order of the marquis de Louvois, then ſuperintendant of the arts and manufactories of France; the ſubſtance of which we ſhall here ſubjoin.

Method of Fulling *Cloths and Woollen Stuffs with Soap:*—A coloured cloth, of about 45 ells, is to be laid in the uſual manner in the trough of a fulling-mill; without firſt ſoaking it in water, as is commonly practiſed in many places. To full this trough of cloth, 15 pounds of ſoap are required; one-half of which is to be melted in two pails of river or ſpring water, made as hot as the hand can well bear it. This ſolution is to be poured by little and little upon the cloth, in proportion as it is laid in the trough: and thus it is to be fulled for at leaſt two hours; after which, it is to be taken out and ſtretched. This done, the cloth is immediately returned into the ſame trough, without any new ſoap, and there fulled two hours more. Then taking it out, they wring it well, to expreſs all the greaſe and filth. After the ſecond fulling, the remainder of the ſoap is diſſolved as in the former, and caſt four different times on the cloth; remembering to take out the cloth every two hours, to ſtretch it, and undo the plaits and wrinkles it has acquired in the trough. When they perceive it ſufficiently fulled, and brought to the quality and thickneſs required, they ſcour it for good in hot water, keeping it in the trough till it be quite clean. As to white cloths; in regard theſe full more eaſily and in leſs time than coloured ones, a third part of the ſoap may be ſpared.

Fulling of Stockings, Caps, &c. ſhould be performed ſomewhat differently; viz. either with the feet or the hands; or a kind of rack, or wooden machine, either armed with teeth of the ſame matter, or elſe horſes or bullocks teeth. The ingredients made uſe of herein are, urine, green ſoap, white ſoap, and fuller's earth. But the urine is alſo reckoned prejudicial here. Woven ſtockings, &c. ſhould be fulled with ſoap alone: for thoſe that are knit, earth may be uſed with the ſoap. Indeed it is frequent to full theſe kinds of works with the mill, after the uſual manner of cloth, &c. But that is too coarſe and violent a manner, and apt to damage the work unleſs it be very ſtrong.

FULMAR, in ornithology. See Procellaria.

Fulmar, or *Foumart.* See Mustela.

FULMINATING, ſomething that thunders or reſembles thunder.

Fulminating Gold, Silver, Copper, Quickſilver, &c. See Chemistry-*Index* at *Fulminating.*

FULMINATION, in chemiſtry, the ſame with detonation. See Detonation and Nitre.

Fulmination, in the Romiſh canon law, a ſentence of a biſhop, official, or other eccleſiaſtic appointed by the pope, by which it is decreed that ſome bull ſent from the pope ſhall be executed.

FUMARIA, fumitory: A genus of the pentandria order, belonging to the diadelphia claſs of plants; and in the natural method ranking under the 24th order, *Corydales.* The calyx is diphyllous; the corolla ringent; and there are two membranaceous filaments, each of which has three antheræ. There are a number of different ſpecies; all of them low, ſhrubby, and deciduous and evergreen plants, growing from two to ſix or ſeven feet high, adorned with ſmall ſimple leaves, and papilionaceous flowers of different colours. The moſt remarkable is the officinalis, or common fumitory; which grows naturally in ſhady cultivated grounds, and produces ſpikes of purpliſh flowers in May and June. It is very juicy, of a bitter taſte, without any remarkable ſmell.—The medical effects of this herb are, to ſtrengthen the tone of the bowels, gently looſen the belly, and promote the urinary and other natural ſecretions. It is principally recommended in melancholic, ſcorbutic, and cutaneous diſorders, for opening obſtructions of the viſcera, attenuating and promoting the evacuation of viſcid juices. Frederic Hoffman had a very great opinion of it as a purifier of the blood; and aſſures us, that in this intention ſcarce any plant exceeds it. Cows and ſheep eat the plant; goats are not fond of it; horſes and ſwine refuſe it.

FUMIGATION, in chemiſtry, a kind of calcination, when metals or other hard bodies are corroded or ſoftened by receiving certain fumes for that purpoſe.

Fumigation, in medicine. By the ſubtile fumes that are inſpired as well as inhaled into our bodies, much benefit or prejudice is produced, according to the nature of the matter, and the conſtitution into which it is received; as is evident from the palſies produced among workers in lead mines, &c. and the benefits received in many caſes when the air is impregnated with ſalutary materials. Catarrhs and catarrhous coughs are relieved by fumes received with the breath; and by the ſame method, expectoration is aſſiſted in humoural aſthmas; and even ulcers in the lungs are ſaid to have been healed by this method. The advantage of mercurial fumigations in the cure of venereal ulcers is known to every practitioner.

FUMITORY, in botany. See Fumaria.

FUNAMBULUS, among the Romans, was what we call a *rope-dancer,* and the Greeks *ſchœnobates.* See *Rope-Dancer.*

There was a funambulus, it ſeems, who performed at the time when the Hecyra of Terence was acted; and the poet complains, that the ſpectacle prevented the people from attending to his comedy. *Ita populus ſtudio ſtupidus in* funambulo, *animum occuparat.*

At Rome, the funambuli firſt appeared under the conſulate of Sulpicius Pæticus and Licinius Stolo, who were the firſt introducers of the ſcenic repreſentations. It is added, that they were firſt exhibited in the iſland of the Tyber, and that the cenſors Meſſala and Caſſius afterwards promoted them to the theatre.

In the *Floralia,* or *ludi Florales,* held under Galba, there were funambulatory elephants, as we are informed by Suetonius. Nero alſo ſhowed the like, in honour of his mother Agrippina. Vopiſcus relates the ſame of the time of Carinus and Numerianus.

FUNCHAL, an epiſcopal town of Madeira, in an iſland of the Atlantic ocean, over-againſt the coaſt of Morocco. It is large, ſtrong, handſome, and populous, with fine churches. The principal trade conſiſts in ſweetmeats and wines. It belongs to the Portugueſe; and is ſeated in a fertile valley, at the foot of a mountain from whence ſeveral ſtreams proceed. W. Long. 14. 30. N. Lat. 31. 30.

FUNCTION, the act of fulfilling the duties of any employment.

FUNCTION, being alſo applied to the actions of the body, is by phyſicians divided into vital, animal, and natural. The *vital* functions are thoſe neceſſary to life, and without which the individual cannot ſubſiſt; as the motion of the heart lungs, &c. The *natural* functions are ſuch as it cannot ſubſiſt any conſiderable time without; as the digeſtion of the aliment, and its converſion into blood. Under *animal* functions are included the ſenſes of touching, taſting, &c. memory, judgment, and voluntary motion; without any or all of which an animal may live, but not very comfortably.

The animal functions perform the motion of the body by the action of the muſcles; and this action conſiſts chiefly in the ſhortening of the fleſhy fibres, which is called *contraction*, the principal agents of which are the arteries and nerves diſtributed in the fleſhy fibres.

All parts of the body have their own functions, or actions, peculiar to themſelves. Life conſiſts in the *exerciſe* of theſe functions, and health in the *free* and *ready* exerciſe of them.

FUND, in general, ſignifies any ſum of money appropriated for a particular purpoſe. Thus, that part of the national revenue which is ſet aſide for the payment of the national debt, is called the *ſinking fund*. But, when we ſpeak of *the funds*, we generally mean the large ſums which have been lent to government, and conſtitute the national debt; and for which the lenders, or their aſſignees, receive intereſt from revenues allotted for that purpoſe. The term *ſtock* is uſed in the ſame ſenſe, and is alſo applied to the ſums which form the capital of the bank of England, the Eaſt India and South Sea companies; the proprietors of which are intitled to a ſhare of the profits of the reſpective companies.

The practice of funding was introduced by the Venetians and Genoeſe in the 16th century, and has been adopted ſince by moſt of the nations in Europe. Princes had often borrowed money, in former times, to ſupply their exigencies, and ſometimes mortgaged their territories in ſecurity: but theſe loans were generally extorted, and their payment was always precarious; for it depended on the good faith and ſucceſs of the borrower, and never became a regular burden on poſterity. The origin of funds is derived from the peculiar manners and circumſtances of modern Europe. Since the invention of gun-powder, and the progreſs of commerce, the military occupation has become a diſtinct employment in the hands of mercenaries; the apparatus of war is attended with more expence; and the deciſion of national quarrels has often been determined by command of money rather than by national bravery. Ambitious princes have therefore borrowed money, in order to carry on their projects with more vigour. Weaker ſtates have been compelled, in ſelf-defence, to apply to the ſame reſource; the wealth introduced by commerce has afforded the means; the regularity of adminiſtration, eſtabliſhed in conſequence of the progreſs of civility, has increaſed the confidence of individuals in the public ſecurity; the complicated ſyſtem of modern policy has extended the ſcenes of war, and prolonged their duration; and the colonies eſtabliſhed by the mercantile nations have rendered them vulnerable in more points, and increaſed the expence of defending them.

When a greater ſum has been required for the annual expence than could eaſily be ſupplied by annual taxes, the government have propoſed terms, to their own ſubjects, or foreigners, for obtaining an advance of money, by mortgaging the revenue of future years for their indemnification. This mortgage may either be for a limited period, or perpetual. If the ſum allotted annually for the benefit of thoſe who advance the money, be conſiderably greater than the intereſts of the ſums advanced, they may agree to accept of ſuch allowance, for a limited time, as a full equivalent. Thus, they may either agree for the caſual produce of the revenue aſſigned; or a fixed annuity for a greater or leſs number of years; or a lifeannuity to themſelves or nominees; or an annuity for two or more lives; or an annuity, with the benefit of ſurvivorſhip, called a *tontine*, in which ſcheme, the whole ſum to which the original annuitants were intitled continues to be diſtributed among the ſurvivors.

The eſtabliſhment of the funds was introduced in Britain at the revolution; and has ſince been gradually enlarged, and carried to an amazing extent. The various methods abovementioned have been uſed in their turns, but perpetual annuities have been granted for the greateſt part; and, even when the money was originally advanced on other conditions, the lenders have been ſometimes induced, by ſubſequent offers, to accept of perpetual annuities, inſtead of the former terms. The debt for which perpetual annuities are granted, is called the *redeemable debt*, and the other is called the *irredeemable debt*. Although the debts thus contracted by government are ſeldom paid for a long term of years; yet any creditor of the public may obtain money for what is due him when he pleaſes, by transferring his property in the funds to another; and regular methods are appointed for tranſacting theſe transfers in an eaſy manner. By means of this, the ſtocks become a kind of circulating capital; and have the ſame effect, in ſome reſpects, as the circulating money in the nation. When a ſtockholder transfers his ſhare, he may ſometimes be able to obtain a greater price than the original value, and at other times be obliged to accept of a leſs one. The value of the funds depends on the proportion between the intereſt they bear, and the benefit which may be obtained by applying the money to other purpoſes. It is influenced by the plenty or ſcarcity of money, and by the quantity of the public debt; and it is impaired by any event which threatens the ſafety, or weakens the credit of the government.

The buſineſs of ſtock-jobbing is founded on the variation of the prices of ſtock. Perſons poſſeſſed of real property may buy or ſell ſtock, according to their notion that the value is likely to riſe or fall, in expectation of making profit by the difference of price. And a practice has taken place among perſons who often poſſeſs no property in the funds, to contract for the ſale of ſtock againſt a future day, at a price now agreed on. For inſtance; A agrees to ſell B 1000 l. of bank-ſtock, to be transferred, in 20 days, for 1200 l. A has, in fact, no ſuch ſtock; but, if the price of bank-ſtock, on the day appointed for the transfer, ſhould be only 118 *per cent.* A may purchaſe as much as will enable him to fulfil his bargain for 1180 l. and thus gains 20 l. by the tranſaction; on the contrary, if the price of bank ſtock be 125 *per cent.* he will looſe 50 l. The buſineſs is generally ſettled without any actual purchaſe or transfer of ſtock, by A paying to B, or receiving from him, the difference between the current price of the ſtock on the day appointed and the price bargained for.

This practice, which is really nothing elſe than a wager concerning the price of ſtock, is contrary to law; yet it is carried on to a great extent. In the language of Exchange-alley, where matters of this kind are tranſacted, the buyer is called a *bull,* and the ſeller a *bear.* As neither party can be compelled by law to implement theſe bargains, their ſenſe of honour, and the diſgrace and loſs of future credit, which attend a breach of contract, are the principles by which the buſineſs is ſupported. When a perſon declines to pay his loſs, he is called a *lame duck,* and dare never afterwards appear in the Alley. This opprobrious appellation, however, is not beſtowed on thoſe whoſe failure is owing to want of ability, providing they make the ſame ſurrender of their property voluntarily, which the law would have exacted if the debt had been intitled to its ſanction.

The intereſt or dividend on the ſtock is paid half-yearly; and the purchaſer has the benefit of the intereſt due on the ſtock he buys, from the laſt term to the time of purchaſe. Therefore the prices of the ſtocks riſe gradually, *cæteris paribus,* from term to term, and fall at the term when the intereſt is paid. In comparing the prices of the different ſtocks, it is neceſſary to advert to the term when the laſt intereſt was paid; and, allowance being made for this circumſtance, the prices of all the government ſtock, which bear intereſt at the ſame rate, muſt be nearly the ſame, as they all depend upon the ſame ſecurity.

When a loan is propoſed, ſuch terms muſt be offered to the lenders, as may render the tranſaction beneficial: and this is now regulated by the prices of the old ſtocks. If the ſtocks, which bear intereſt at 4 *per cent.* ſell at par, or rather above, the government may expect to borrow money at that rate; but, if theſe ſtocks are under par, the government muſt either grant a higher intereſt, or ſome other advantage to the lenders, in compenſation for the difference. For this purpoſe, beſides the perpetual annuity, another annuity has ſometimes been granted for life, or for a term of years. Lotteries have frequently been employed to facilitate the loan, by intitling the ſubſcribers to a certain number of tickets, for which no higher price is charged than the exact value diſtributed in prizes, tho' their market-price is generally 2 l. or 3 l. higher. Sometimes an abatement of a certain proportion of the capital has been granted, and a lender intitled to hold 100 l. ſtock, though in reality he advanced no more perhaps than 95 l.

It belongs to the Chancellor of the Exchequer to propoſe the terms of the loan in parliament; and he generally makes a previous agreement with ſome wealthy merchants who are willing to advance the money on the terms propoſed. The ſubſcribers to the loan depoſit a certain part of the ſum ſubſcribed; and are bound to pay the reſt by inſtalments, or ſtated proportions, on appointed days, under pain of forfeiting what they have depoſited. For this they are intitled, perhaps not only to hold their ſhare in the capital, but to an annuity for 10 years, and to the right of receiving a certain number of lottery-tickets on advantageous terms. They may ſell their capital to one perſon, their annuity to a ſecond, and their right to the tickets to a third. The value of all theſe intereſts together is called *omnium*; and, in order to obtain a ready ſubſcription, it ought to amount to 102 l. or upwards, on 100 l. of capital. This difference is called the *bonus* to the ſubſcribers.

The capital advanced to the public, in the form of transferable ſtocks, and bearing intereſt from taxes appropriated for that purpoſe, is called the *funded debt.* Beſides, there is generally a conſiderable ſum due by government, which is not diſpoſed of in that manner, and therefore is diſtinguiſhed by the appellation of the *unfunded debt.* This may ariſe from any ſort of national expence, for which no proviſion has been made, or for which the proviſion has proved inſufficient. The chief branches are,

1ſt, *Exchequer Bills.* Theſe are iſſued from the exchequer, generally by appointment of parliament, and ſometimes without ſuch appointment, when exigencies require. They bear intereſt from the time when iſſued, and are taken in by the bank of England, which promotes their circulation.

2d, *Navy-Bills.* The ſums annually granted for the navy have always fallen ſhort of what that ſervice required. To ſupply that deficiency, the admiralty iſſues bills in payment of victuals, ſtores and the like, which bear intereſt ſix months after the time iſſued. The debt of the navy thus contracted is diſcharged, from time, to time by parliament.

In time of war the public expences, ſince the revolution, have always been much greater than the annual revenue: and large ſums have conſequently been borrowed. In the time of peace, the revenue exceeds the expence, and part of the public debts have frequently been paid off. But though there have been more years of peace than of war ſince the funds were eſtabliſhed, the debts contracted during each war have much exceeded the payments during the ſubſequent, peace. This will appear by the following abſtract of the progreſs of the national debt.

Debt at peace of Ryſwich, 1697	L. 21,515,472
Debt at the beginning of war 1701	16,394,701
Diſcharged during peace 1697 to 1701	5,121,071
Debt at peace of Utrecht 1714, including value of annuities afterwards ſubſcribed to South-Sea ſtock -	55,282,978
Contracted in war 1701 to 1714	38,888,277

Fundament
||
Fundamental.

Debt at the beginning of war 1740, including L. 1,000,000 charged on civil liſt - - -	L.47,954,623
Diſcharged during peace 1714 to 1739	7,328,355
Debt at peace of Aix-la-Chapelle, 1748	79,193,313
Contracted during war 1740 to 1748	31,238,690
Debt at beginning of war 1756	73,289,673
Paid off during peace 1748 to 1756	5,903,640
Debt funded at the peace 1763, including L.9,839,597 then owing, which was funded in the ſubſequent years	133,957,270
Beſides this, there was about L.6,000,000 of debt paid off, without ever being funded.	
Funded debt, 1775	125,000,000
Paid off during peace 1763 to 1775, beſides unfunded debt abovementioned	8,959,270
Funded debt at the peace 1783.	211,363,254

FUNDAMENT, in anatomy, the loweſt part of the inteſtinum rectum, called by anatomiſts the *anus*. See Anatomy, n° 93.

FUNDAMENTAL, in general, ſomething that ſerves as a baſe or foundation for another.

Fundamental, in muſic. A *fundamental ſound* is that which forms the loweſt note of the Chord, and from whence are deduced the harmonical relations of the reſt; or, which ſerves for a key to the tone*. The *fundamental baſs* is that which ſerves for a foundation to the harmony. A *fundamental chord* is that whoſe baſs is fundamental, and in which the ſounds are ranged in the ſame order as when they are generated, according to the experiment ſo often repeated, by M. d'Alembert, in his Preliminary Diſcourſe and Elements of Muſic †. But as this order removes the parts to an extreme diſtance from the other, they muſt be approximated by combinations or inverſions; but if the baſs remains the ſame the chord does not for this reaſon ceaſe to bear the name of *fundamental*. Such an example is this chord, *ut mi ſol*, included in the interval of a fifth: whereas, in the order of its generation *ut ſol mi*, it includes a tenth, and even a ſeventeenth; ſince the fundamental *ut* is not the fifth of *ſol*, but the octave of that fifth.

* See *Tonic*.

† See *Muſic*.

Fundamental Baſs. This part in muſic is, according to Rouſſeau, and indeed according to all authors who have proceeded upon M. Rameau's experiment, in its primary idea, that baſs which is formed by the fundamental notes of every perfect chord that conſtitutes the harmony of the piece; ſo that under each chord it cauſes to be heard, or underſtood, the fundamental ſound of that particular chord; that is to ſay, the ſound from whence it is derived by the rules of harmony. From whence we may ſee, that the fundamental baſs can have no other contexture than that of a regular and fundamental ſucceſſion, without which the procedure of the upper parts would be illegitimate.

To underſtand this well, it is neceſſary to be known, that, according to the ſyſtem of Rameau, which Rouſſeau has followed in his Dictionary, every chord, tho' compoſed of ſeveral ſounds, can only have one which is its fundamental, *viz.* that which produces this chord, and which is its baſs according to the direct and natural order. Now the baſs which prevails under all the other parts, does not always expreſs the fundamental ſound, of the chords: for amongſt all the ſounds which form a chord, the compoſer is at liberty to transfer to the baſs that which he thinks preferable; regard being had to the procedure of that baſs, to the beauty of the melody, and above all to the expreſſion, as may afterwards be explained. In this caſe the real fundamental ſound, inſtead of retaining its natural ſtation, which is in the baſs, will either be transferred to ſome of the other parts, or perhaps even entirely ſuppreſſed, and ſuch a chord is called an *inverted* chord.

In reality, ſays Rameau, a chord inverted does not differ from the chord in its direct and natural order from which it was produced: but as theſe ſounds form different combinations, theſe combinations have long been taken for fundamental chords; different names, have been given them, (which may be ſeen at the word Accord, in Rouſſeau's Dictionary). Theſe names, by the perſons who beſtowed them, were thought to create and ſanctify their diſtinctions; as if a difference in names could really produce a difference in the ſpecies.

M. Rameau in his Treatiſe of Harmony has ſhown, and M d'Alembert in his Elements of Muſic has ſtill more clearly evinced, that many of theſe pretendedly different chords were no more than inverſions of one ſingle chord. Thus the chord of the ſixth is no more than the perfect chord of the third transferred to the baſs; by adding a fifth, we ſhall have the chord of the ſixth and fourth. Here there are three combinations of a chord, which only conſiſts of three ſounds; thoſe which contain four ſounds are ſuſceptible of four combinations, ſince each of theſe ſounds may be transferred to the baſs. But in adding beneath this another baſs which, under all the combinations of one and the ſame chord, always preſents the fundamental ſound; it is evident, that conſonant chords are reduced to the number three, and the number of diſſonant chords to four. Add to this all the chords by ſuppoſition, which may likewiſe be reduced to the fundamentals, and you will find harmony brought to a degree of ſimplicity in which no perſon could ever hope to ſee it whilſt its rules remained in that ſtate of confuſion where M. Rameau found them. It is certainly, as that author obſerves, an aſtoniſhing occurrence, that the practice of this art could be carried ſo far as it really was, without knowing its foundation; and that all the rules were ſo exactly found, without having diſcovered the principle on which they depended.

After having ſhown what is the fundamental baſs beneath the chords, let us now ſpeak of its procedure, and of the manner in which it connects theſe chords among themſelves. Upon this point the precepts of the art may be reduced to the ſix following rules.

1. The fundamental baſs ought never to ſound any other notes than thoſe of the ſeries or tone in which the compoſer finds himſelf, or at leaſt thoſe of the ſeries or tone to which he chooſes to make a tranſition. This of all the rules for the fundamental baſs is the firſt and moſt indiſpenſable.

2. By the ſecond, its procedure ought to be ſo implicitely ſubjected to the laws of modulation, as never to ſuffer the idea of a former mode to be loſt till that of a ſubſequent one can be legitimately aſſumed; that is to ſay, that the fundamental baſs ought never to be devious,

vious, or ſuffer us to be one moment at a loſs in what mode we are.

3. By the third, it is ſubjected to the connection of chords and the preparation of diſſonances: a manœuvre which, as we ſhall afterwards ſee, is nothing elſe but a method of producing this connection, and which of conſequence is only neceſſary when the connection cannot ſubſiſt without it. See CONNECTION, PREPARATION.

4. By the fourth, it is neceſſitated, after every diſſonance, to purſue that career, which the reſolution of the diſſonance indiſpenſibly preſcribes. See RESOLUTION.

5. By the fifth, which is nothing elſe but a conſequence of the former, the fundamental baſs ought only to move by conſonant intervals; except alone in the operation of a broken cadence, or after a chord of the ſeventh diminiſhed, where it riſes diatonically. Every other motion of the fundamental baſs is illegitimate.

6. By the ſixth, in ſhort, the fundamental baſs or harmony ought not to be ſyncopated; but to diſtinguiſh the bars and the times which they contain, by changes of chords properly marked with cadences; in ſuch a manner, for inſtance, that the diſſonances which ought to be prepared may find their preparation in the imperfect time, but chiefly that all the repoſes may happen in the perfect time. This ſixth rule admits of an infinite number of exceptions; but the compoſer ought however to be attentive to it, if he would form a muſic in which the movements are properly marked, and in which the bars may end gracefully.

Wherever theſe rules are obſerved, the harmony ſhall be regular and without fault: this, however, will not hinder the muſic from being deteſtable. See COMPOSITION.

A word of illuſtration on the fifth rule may not be uſeleſs. Whatever turn may be given to a fundamental baſs, if it is properly formed, one of theſe alternatives muſt always be found; either perfect chords moving by conſonant intervals, without which theſe chords would have no connection; or, diſſonant chords in operations of cadence: in every other caſe, the diſſonance can neither be properly placed nor properly reſolved.

From thence it follows, that the fundamental baſs cannot move regularly but in one of theſe three manners. 1ſt, To riſe or deſcend by a third or by a ſixth. 2dly, By a fourth or a fifth. 3dly, To riſe diatonically by means of the diſſonance which forms the connection, or by a licence upon a perfect chord. With reſpect to a diatonic deſcent, it is a motion abſolutely prohibited to the fundamental baſs; or, at moſt, merely tolerated in caſes where two perfect chords are in ſucceſſion, divided by a cloſe expreſſed or underſtood. This rule has no other exception: and it is from not diſcerning the foundation of certain tranſitions, that, M. Rameau has cauſed the fundamental baſs to deſcend diatonically under chords of the ſeventh; an operation which is impracticable in legitimate harmony. See CADENCE, DISSONANCE.

The fundamental baſs, which they add for no other reaſon than to ſerve as a proof of the harmony, muſt be retrenched in execution, and often in practice it would have a very bad effect; for it is, as M. Rameau very properly obſerves, intended for the judgment, and not for the ear. It would at leaſt produce a monotony extremely nauſeous by frequent returns of the ſame chord, which they diſguiſe and vary more agreeably by combining it in different manners upon the continued baſs, without reckoning upon the different inverſions of harmony, which furniſh a thouſand means of adding new beauties to the muſic and new energy to the expreſſion. See CHORD, INVERSION.

But it will be objected, If the fundamental baſs is not uſeful in compoſing good muſic, if it muſt even be retrenched in practice, what good purpoſe, then, can it ſerve? We anſwer, that, in the firſt place, it ſerves for a rule to ſcholars, upon which they may learn to form a regular harmony, and to give to all the parts ſuch a diatonic and elementary procedure as is preſcribed them by that fundamental baſs. It does more, as we have already ſaid: it proves whether a harmony already formed be juſt and regular; for all harmony which cannot be ſubjected to the teſt of a fundamental baſs, muſt according to all rules be bad. Finally, it ſerves for the inveſtigation of a continued baſs under a given air: though, in reality, he who cannot directly form a continued baſs, will ſcarcely be able to form a fundamental baſs, which is better; and much leſs ſtill will he be able to transform that fundamental baſs into a legitimate continued baſs. Theſe which follow are, however, the principal rules which M. Rameau preſcribes for finding the fundamental baſs of a given air.

1. To aſcertain with preciſion the mode in which the compoſer begins, and thoſe through which he paſſes. There are alſo rules for inveſtigating the modes; but ſo long, ſo vague, ſo incomplete, that with reſpect to this, the ear may be formed long before the rules are acquired; and the dunce who ſhould try to uſe them, would gain no improvement but the habit of proceeding always note by note, whithout even knowing where he is.

2. To try in ſucceſſion under each note the principal chords of the mode, beginning by thoſe which are moſt analogous, and paſſing even to the moſt remote, when the compoſer ſees himſelf under a neceſſity of doing ſo.

3. To conſider whether the chord choſen can ſuit the upper part in what precedes and in what follows, by a juſt fundamental ſucceſſion; and when this is impracticable to return the way he came.

4. Not to change the the note of the fundamental baſs till after having exhauſted all the notes which are allowed in ſucceſſion in the upper part, and which can enter into its chord; or till ſome ſyncopated note in the air may be ſuſceptible of two or a greater number of notes in the baſs, to prepare the diſſonance which may be afterwards reſolved according to rule.

5. To ſtudy the intertexture of the phraſes; the poſſible ſucceſſion of cadences, whether full or avoided; and above all, the pauſes which for ordinary return at the end of every four, or of every two bars, ſo that they may always fall upon perfect and regular cadences.

6. In ſhort, to obſerve all the rules formerly given for the compoſition of the fundamental baſs.—Theſe are the principal obſervations to be made for finding one under any given air; for there are ſometimes ſeve-

ral different ones which may be inveſtigated. But, whatever may be ſaid to the contrary, if the air has accent and character, there is only one juſt fundamental baſs which can be adapted to it.

After having given a ſummary explication of the manner in which a fundamental baſs ſhould be compoſed, it ſhould remain to ſuggeſt the means of tranſforming it into a continued baſs; and this would be eaſy, if it were only neceſſary to regard the diatonic procedure and the agreeable air of this baſs. But let us not imagine that the baſs, which is the guide and ſupport of the harmony, the ſoul, and as it were the interpreter, of the air, ſhould be limited to rules ſo ſimple: there are others which depend upon principles more certain and more radical; fruitful, but latent principles, which have been felt by every artiſt of genius without having been detected by any one. Rouſſeau hopes, that in his letter upon French muſic he inſinuated this principle. For thoſe who underſtand him, he imagines he has ſaid enough concerning it, and can never ſay enough of it for thoſe who do not. See *Rouſſeau's Miſcellanies*, Vol. II. p. 1.

He does not here mention the ingenious ſyſtem by M. Serre of Geneva, nor his double fundamental baſs: becauſe the principles which, with a ſagacity meritorious of praiſe, he had half detected, have afterwards been unfolded by M. Tartini, in a work of which Rouſſeau has given an account in his article SYSTEM.

FUNDI (anc. geog.), a town of Latium, on the Via Appia, near Cajeta; enjoying all the privileges of Roman citizens, except the right of ſuffrage and of magiſtracy. Now *Fondi*; a city of Naples, on the confines of the pope's dominions. E. Long. 14. 20. N. Lat. 41. 35.

FUNDY-BAY, a bay ſeated between New-England and Acadia or New Scotland, in which there is an excellent fiſhery.

FUNEN, or FIONIA, a conſiderable iſland in Denmark, ſeated on the Baltic ſea, and ſeparated from Jutland by a ſtrait called the *Leſſer Belt*, and from the iſland of Zealand by another called the *Great Belt*. It is fertile in wheat and barley; and abounds in cattle, horſes, game of all ſorts, and fiſh. Odenſee is the capital town.

FUNERAL RITES, ceremonies accompanying the interment or burial of any perſon. The word is formed of the Latin *funus*; and the of *funalia*, on account of the torches (which were *funes cera circumdati*) uſed in the funerals of the Romans; though others derive *funus* from the Greek φονος *death* or *ſlaughter*.

Theſe rites differed among the ancients according to the different genius and religion of each country.

The firſt people who ſeem to have paid any particular reſpect to their dead, were the Egyptians, the poſterity of Ham. The firſt cultivators of idolatrous worſhip and ſuperſtition after the flood; they were alſo the firſt who aſſerted the immortality of the ſoul, its migration into all kinds of animals in earth, air, and ſea, and its return to the human body; which they ſuppoſed to be within the term of 3000 years: Hence proceeded their very great care in embalming of their dead bodies, and their being at ſuch vaſt expences, as they were, in building proper repoſitories for them; for they were more ſolicitous about their graves than their houſes: This gave birth to thoſe wonders of the world the pyramids, which were built for the burial of their kings, with ſuch vaſt charges, and almoſt incredible magnificence. See PYRAMID.

Whenever a perſon died among the *Egyptians*, his parents and friends put on mournful habits, and abſtained from all banquets and entertainments. This mourning laſted from 40 to 70 days, during which time they embalmed the body. See EMBALMING.

When this ceremony was finiſhed, the embalmed body was reſtored to the friends, who placed it in a kind of open cheſt, which was preſerved either in their houſes, or in the ſepulchres of their anceſtors. But before the dead were allowed to be depoſited in the tomb, they underwent a ſolemn judgement, which extended even to their kings. Of this remarkable cuſtom we have a particular account in the firſt book of Diodorus Siculus. "Thoſe who prepare to bury a relation, give notice of the day intended for the ceremony to the judges, and to all the friends of the deceaſed; informing them, that the body will paſs over the lake of that diſtrict to which the dead belonged: where, the judges aſſembled, to the number of more than 40, and ranging themſelves in a ſemicircle on the farther ſide of the lake, the veſſel is ſet afloat, which thoſe who ſuperinted the funeral have prepared for this purpoſe. This veſſel is managed by a pilot, called the Egyptian language Charon; and hence they ſay, that Orpheus, travelling in old times into Egypt, and ſeeing this ceremony, formed his fable of the infernal regions, partly from what he ſaw and partly from invention. The veſſel being launched on the lake before the coffin which contains the body is put on board, the law permits all, who are ſo inclined, to produce an accuſation againſt it. If any one ſteps forth, and proves that the deceaſed has led an evil life, the judges pronounce ſentence, and the body is precluded from burial; but if the accuſer is convicted of injuſtice in his charge, he falls himſelf under a conſiderable penalty. When no accuſer appears, or when the accuſer is proved to be an unfair one, the relations, who are aſſembled, change their expreſſions of ſorrow into encomiums on the dead; yet do not, like the Greeks, ſpeak in honour of his family, becauſe they conſider all Egyptians as equally well-born; but they ſet forth the education and manners of his youth, his piety and juſtice in maturer life, his moderation, and every virtue by which he was diſtinguiſhed; and they ſupplicate the infernal deities to receive him as an aſſociate among the bleſt. The multitude join their acclamations of applauſe in this celebration of the dead, whom they conſider as going to paſs an eternity among the juſt below." Such is the deſcription which Diodorus gives of this funeral judicature, to which even the kings of Egypt were ſubject. The ſame author aſſerts that many ſovereigns had been thus judicially deprived of the honours of burial by the indignation of their people: and that the terrors of ſuch a fate had the moſt ſalutary influence on the virtue of their kings.

The funeral rites among the *Hebrews* were ſolemn and magnificent. When any perſon was dead, his relations and friends rent their cloaths; which cuſtom is but faintly imitated by the modern Jews, who only cut off a bit of their garment, in token of affliction. It was uſual to bend the dead perſon's thumb into the hand, and faſten it in that poſture with a ſtring; becauſe the thumb then having the figure of the name of God, they thought the devil would not dare to approach it. When they came to the burying-place, they made a ſpeech to the dead in the following terms: "Bleſſed be God, who has formed thee, fed thee, maintained thee, and taken away thy life. O dead! he knows your numbers, and ſhall one day reſtore your life, &c. Then they ſpoke the elogium, or funeral oration, of the deceaſed; after which they ſaid a prayer, called the *righteouſneſs of judgment*; then turning the face of the deceaſed towards heaven, they called out, "Go in peace."

Among the ancient *Greeks* it was uſual ſometimes before the interment, to put a piece of money into the mouth of the deceaſed, which was thought to be Charon's fare for wafting the departed ſoul over the infernal river. This ceremony was not uſed in thoſe countries which were ſuppoſed to be ſituated in the neighbourhood of the infernal regions, and to lead thither by a ready and direct road. The corpſe was likewiſe furniſhed with a cake, compoſed of flour, honey, &c. which was deſigned to appeaſe the fury of Cerberus the door-keeper of hell, and to procure the ghoſt a ſafe and quiet entrance. During the time the corpſe continued in the houſe, there ſtood before the door a veſſel of water: the deſign of which was, that thoſe concerned about the body might purify themſelves by waſhing; it being the opinion of the Greeks, as well as of the Jews, that pollution was contracted by touching a dead body.

The ceremonies by which they expreſſed their ſorrow for the death of their friends were various; but it ſeems to have been a conſtant rule to recede as much as poſſible in habit and behaviour from their ordinary cuſtoms. For this reaſon they abſtained from banquets and entertainments; they diveſted themſelves of all ornaments; they tore, cut off, or ſhaved their hair, which they caſt into the funeral pile, to be conſumed with the body of their deceaſed friend. Sometimes they threw themſelves on the ground, and rolled in the duſt, or covered their head with aſhes; they beat their breaſts, and even tore their fleſh with their nails, upon the loſs of a perſon they much lamented. When perſons of rank, ſuch as public magiſtrates or great generals, died, the whole city put on a face of mourning; all public meetings were intermitted; the ſchools, baths, ſhops, temples, and all places of concourſe, were ſhut up.

After interment followed the *epulæ* or feaſts, at which the company uſed to appear crowned; when they ſpoke in praiſe of the dead, ſo far as they could go with truth, it being eſteemed a notorious wickedneſs to lie upon ſuch an occaſion. And not only at thoſe feaſts, but even before the company departed from the ſepulchre, they were ſometimes entertained with a panegyric upon the dead perſon.

The Grecian ſoldiers, who died in war, had not only their tombs adorned with inſcriptions ſhowing their names, parentage, and exploits, but were alſo honoured with an oration in their praiſe. Particularly the cuſtom among the Athenians in the interment of their ſoldiers was as follows, namely, "They uſed to place the bodies of their dead in tents three days before the funeral, that all perſons might have an opportunity to find out their relations, and pay their laſt reſpects to them. Upon the fourth day, a coffin of cypreſs was ſent from every tribe, to convey the bones of their own relations; after which, went a covered hearſe, in memory of thoſe whoſe bodies could not be found. All theſe, accompanied with the whole body of the people, were carried to the public burying-place, called *Ceramicus*, and there interred. One oration was ſpoken in commendation of them all, and their monuments adorned with pillars, inſcriptions, and all other ornaments uſual about the tombs of the moſt honourable perſons. The oration was pronounced by the fathers of the deceaſed perſons, who had behaved themſelves moſt valiantly. Thus, after the famous battle at Marathon, the fathers of Callimachus and Cynægyrus were appointed to make the funeral oration. And upon the return of the day, upon which the ſolemnity was firſt held, the ſame oration was conſtantly repeated every year."

Interring or laying the dead in the ground, ſeems to have been the moſt ancient practice among the Greeks; though burning came afterwards to be generally uſed among them. It was cuſtomary to throw into the funeral pile thoſe garments the deceaſed uſually wore. The pile was lighted by one of the deceaſed's neareſt relations or friends, who made prayers and vows to the winds to aſſiſt the flames, that the body might quickly be reduced to aſhes; and during the time the pile was burning, the dead perſons's friends ſtood by it, pouring libations of wine, and calling upon the deceaſed.

The funeral rites among the *ancient Romans* were very numerous. The deceaſed was kept ſeven days; and every day waſhed with hot water, and ſometimes with oil, that, in caſe he were only in a ſlumber, he might be thus waked; and every now and then his friends meeting, made a horrible outcry or ſhout, with the ſame view; which laſt action they called *conclamatio*. The third conclamation was on the ſeventh day; when, if no ſigns of life appeared, the defunct was dreſſed and embalmed by the pollinctores; placed in a bed near the door, with his face and heels towards the ſtreet; and the outſide of the gate, if the deceaſed were of condition, was garniſhed with cypreſs boughs. In the courſe of theſe ſeven days, an altar was raiſed near his bed ſide, called *acerra*; on which his friends every day offered incenſe; and the libitinarii provided things for the funeral.

On the ſeventh day a crier was ſent about the city, to invite the people to the ſolemnization of the funeral in theſe words: *Exequias L. Tit. filii, quibus eſt commodum ire, jam tempus eſt. Ollus* (i. e. *ille*) *ex ædibus effertur*. The people being aſſembled, the laſt conclamation ended, and the bed was covered with purple: a trumpeter marched forth, followed by old women called *præficæ*, ſinging ſongs in praiſe of the deceaſed; laſtly, the bed followed, borne by the next relations; and, if the perſon were of quality and office, the waxen images of all his predeceſſors were carried before him on poles. The bed was followed by his children, kindred, &c. *atrati*, or in mourning: from which act of following the corpſe, theſe funeral rites were called *exequiæ*. The body thus brought to the roſtra, the next of kin, *laudobat defunctum pro roſtris*, made a funeral oration in his praiſe and that of his anceſtors. This done, the body was carried to the *pyra*, or funeral pile, and there burnt: his friends firſt cutting off a finger, to be buried with a ſecond ſolemnity. The body conſumed, the aſhes were gathered ; and the prieſt ſprinkling the company thrice with clean water, the eldeſt of the *præficæ* crying aloud, *ilicet*, diſmiſſed the people, who took their leave of the deceaſed in this form, *Vale, vale, vale : nos te ordine quo natura permiſerit, ſequemur.*— The aſhes, incloſed in an urn, were laid in the ſepulchre or tomb.

The *ancient Chriſtians* teſtified their abhorrence of the Pagan cuſtom of burning the dead ; and always depoſited the body entire in the ground : and it was uſual to beſtow the honour of embalming upon the martyrs at leaſt, if not upon others. They prepared the body for burial, by waſhing it with water, and dreſſing it in a funeral attire. The exportation or carrying forth of the body was performed by near relations, or perſons of ſuch dignity as the circumſtances of the deceaſed required. Pſalmody, or ſinging of pſalms, was the great ceremony uſed in all funeral proceſſions among the ancient Chriſtians.

In the *Romiſh church*, when a perſon is dead, they waſh the body, and put a crucifix in its hand. At its feet ſtands a veſſel full of holy water, and a ſprinkler, that they who come in may ſprinkle both themſelves and the deceaſed. In the mean time ſome prieſt ſtands by the corpſe, and prays for the deceaſed till it is laid in the earth. In the funeral proceſſion, the exorciſt walks firſt, carrying the holy water ; next the croſs-bearer, afterwards the reſt of the clergy, and laſt of all the officiating prieſt. They all ſing the *miſerere*, and ſome other pſalms ; and at the end of each pſalm a *requiem*. We learn from Alet's ritual, that the faces of deceaſed laymen muſt be turned towards the altar, when they are placed in the church ; and thoſe of the clergy, towards the people. The corpſe is placed in the church ſurrounded with lighted tapers : after the office for the dead, maſs is ſaid ; then the officiating prieſt ſprinkles the corpſe thrice with holy water, and as often throws incenſe on it. The body being laid in the grave, the friends and relations of the deceaſed ſprinkle the grave with holy water.

The funeral ceremonies of the *Greek church* are much the ſame with thoſe of the Latin. It needs only to be obſerved, that, after the funeral ſervice, they kiſs the crucifix, and ſalute the mouth and forehead of the deceaſed : after which each of the company eats a bit of bread and drinks a glaſs of wine in the church, wiſhing the ſoul a good repoſe, and the afflicted family all conſolation.

FUNERAL-*Games*, a part of the ceremony of the ancient funerals.

It was cuſtomary for perſons of quality, among the ancient Greeks and Romans, to inſtitute games, with all ſorts of exerciſes, to render the death of their friends more remarkable. This practice was generally received, and is frequently mentioned by ancient writers. Patroclus's funeral games take up the greateſt part of one of Homer's Iliads ; and Agamemnon's ghoſt is introduced by the ſame poet, telling the ghoſt of Achilles, that he had been a ſpectator at a great number of ſuch ſolemnities.

The celebration of theſe games among the Greeks moſtly conſiſted of horſe-races ; the prizes were of different ſorts and value, according to the quality and magnificence of the perſon that celebrated them. The garlands given to victors on this occaſion were uſually of parſley, which was thought to have ſome particular relation to the dead.

Thoſe games, among the Romans, conſiſted chiefly of proceſſions ; and ſometimes of mortal combats of gladiators around the funeral pile. They, as well as the Greeks, had alſo a cuſtom, though very ancient, of cutting the throats of a number of captives before the pile, as victims to appeaſe the manes of the deceaſed. Cæſar relates, that the Gauls had this cuſtom.

The funeral games were aboliſhed by the emperor Claudius.

FUNERAL *Oration*, a diſcourſe pronounced in praiſe of a perſon deceaſed, at the ceremony of his funeral.

This cuſtom is very ancient. In the latter part of the account above given of the Egyptian ceremonies of interment, may be perceived the firſt rudiments of funeral orations, and what was the ſubject of them, which were afterwards moulded into a more polite and regular form by other nations, who adopted this cuſtom. Nor can we omit remarking, that thoſe funeral ſolemnities were attended not only with orations in praiſe of the deceaſed, but with prayers for him ; which prayers, it ſeems, were made by one who perſonated the deceaſed : an entire form of one of them is preſerved by Porphyry, and perhaps it may in ſome meaſure gratify the reader's curioſity to recite it from him. When (ſays he) they (the Egyptians) embalm their deceaſed nobles, they privately take out the entrails, and lay them up in an ark or cheſt : moreover, among other things which they do in favour of the deceaſed, lifting up the ark or cheſt to the ſun, they invoke him ; one of the *Libitinarii* making a prayer for the deceaſed, which Euphrantus has tranſlated out of the Egyptian language, and is as follows :—O Lord, the ſun, and all the gods who give life to men, receive me, and admit me into the ſociety of the immortal ones ; for as long as I lived in this world, I religiouſly worſhipped the gods whom my parents ſhowed me, and have always honoured thoſe who begat my body : nor have I killed any man, nor have I defrauded any of what has been committed to my truſt, nor have I done any thing which is inexpiable. Indeed, whilſt I was alive, if I have ſinned either by eating or drinking any thing which was not lawful ; not through myſelf have I ſinned, but through theſe, ſhowing the ark and cheſt where the entrails were. And having thus ſpoke, he caſts it into the river, but the reſt of the body he embalms as pure."

The Grecians received the ſeeds of ſuperſtition and idolatrous worſhip from the Egyptians, through the coming of Cecrops, Cadmus, Danaus, and Erechtheus, into Greece ; and among other cuſtoms tranſplanted from Egypt, were the ſolemnities uſed at the burial of the dead. Of theſe, an encomium on the deceaſed always formed a part, as particularly noticed under the preceding article.

From the Egyptians and Grecians, eſpecially from the latter, the Romans received many of their laws and cuſtoms, as well as much of their polytheiſm and idolatrous worſhip. It is well known, that the cuſtom of making funeral orations in praiſe of the dead, obtained among them ; and the manner in which their funeral ſervices were performed has been already de-

Funeral.

ſcribed. The corpſe being brought into their great oratory, called the *Roſtra*, the next of the kin *laudabat defunctum pro roſtris*, that is, made a funeral oration, in the commendation principally of the party deceaſed, but touching the worthy acts alſo of thoſe his predeceſſors whoſe images were there preſent. The account given by Dr Kennet is in theſe words: "In all the funerals of note, eſpecially in the public or indictive, the corpſe was firſt brought with a vaſt train of followers into the Forum; here one of the neareſt relations aſcended the roſtra, and obliged the audience with an oration in praiſe of the deceaſed. If none of the kindred undertook the office, it was diſcharged by ſome of the moſt eminent perſons in the city for learning and eloquence, as Appian reports of the funeral of Sylla. And Pliny the younger reckons it as the laſt addition to the happineſs of a very great man, that he had the honour to be praiſed at his funeral by the moſt eloquent Tacitus, then conſul; which is agreeable to Quintilian's account of this matter, *Nam et funebres*, &c. For the funeral orations (ſays he) depend very often on ſome public office, and by order of ſenate are many times given in charge to the magiſtrates to be performed by themſelves in perſon. The invention of this cuſtom is generally attributed to Valerius Poplicola, ſoon after the expulſion of the regal family. Plutarch tells us, that honouring his colleague's obſequies with a funeral oration, it ſo pleaſed the Romans, that it became cuſtomary for the beſt men to celebrate the funerals of great perſons with ſpeeches in their commendations." Thus Julius Cæſar, according to cuſtom, made an oration in the roſtra, in praiſe of his wife Cornelia, and his aunt Julia, when dead; wherein he ſhewed, that his aunt's deſcent, by her mother's ſide, was from kings, and by her father's from the gods. Plutarch ſays, that "he approved of the law of the Romans, which ordered ſuitable praiſes to be given to women as well as to men, after death." Though by what he ſays in another place, it ſeems that the old Roman law was, that funeral orations ſhould be made only for the elder women; and therefore he ſays, that Cæſar was the firſt that made one upon his own wife, it not being then uſual to take notice of younger women in that way: but by that action he gained much favour from the populace, who afterwards looked upon him, and loved him as a very mild and good man. The reaſon why ſuch a law was made in favour of the women, Livy tell us, was this, That when there was ſuch a ſcarcity of money in the public treaſury, that the ſum agreed upon to give the Gauls to break up the ſiege of the city and capital could not be raiſed, the women collected among themſelves and made it up; who hereupon had not only thanks given them, but this additional honour, that after death, they ſhould be ſolemnly praiſed as well as the men: which looks as if, before this time, only the men had thoſe funeral orations made for them.

This cuſtom of the Romans very early obtained among the Chriſtians. Some of their funeral ſermons or orations are now extant, as that of Euſebius on Conſtantine; and thoſe of Nazianzen on Baſil and Cæſarius; and of Ambroſe on Valentinian, Theodoſius, and others. Gregory, the brother of Baſil, made επικηδειον λογον, a funeral oration, for Melitius biſhop of Antioch: in which orations, they not only praiſed the dead, but addreſſed themſelves to them, which ſeems to have introduced the cuſtom of praying to departed ſaints. Now theſe orations were uſually made before the bodies of the deceaſed were committed to the ground; which cuſtom has been more or leſs continued ever ſince, to this day.

Funeral, Fungi.

Thus it appears, that thoſe rites and ceremonies among the heathens, which have been delivered from one people to another, are what have given birth to

FUNERAL *Sermons and Orations* among Chriſtians. Though this practice is conſiderably improved, and cleared of many things which would ſmell too rank of paganiſm, and is thrown into a method which, perhaps, may be of ſome ſervice to Chriſtianity; yet, notwithſtanding this new dreſs, its original may very eaſily be diſcerned. The method in which the characters of deceaſed perſons are given in our funeral ſermons, is very much the ſame with that obſerved in thoſe pagan orations; where firſt an account is given of the parentage of the deceaſed, then of his education; after that, we hear of his conduct in riper years: then his many virtues are reckoned up, with his generous, noble, and excellent performances.—Nor let the practice be condemned becauſe of its riſe and original; for why may not the cuſtom of heathens, if juſt and laudable in themſelves, and no ways pernicious to Chriſtianity in their conſequences, be followed by Chriſtians? Only, ſince we are come into this practice, there is one thing we ſhould take care to follow them in; and that is, not to make thoſe ſermons or orations for every one; but for thoſe only whoſe characters are diſtinguiſhed, who have been eminently uſeful in the world, and in the church of Chriſt. The old heathens honoured thoſe alone with this part of the funeral ſolemnity, who were men of probity and juſtice, renowned for their wiſdom and knowledge, or famous for warlike exploits: This, as Cicero* informs us, being part of the law for burials, which directs, that the praiſes only of honourable perſons ſhall be mentioned in the oration. It would be much more agreeable, therefore, if our funeral diſcourſes were not ſo common, and if the characters given of the deceaſed were more juſt; devoid of that fulſom flattery with which they too often abound.

FUNGI (from σφογγος *fungus*), the name of the 4th order of the 24th claſs of vegetables, in the Linnæan ſyſtem; comprehending all thoſe which are of the muſhroom kind, and which in Tournefort conſtitute the 2d, 3d, 4th, 5th, 6th, 7th, and 8th, genera of the firſt ſection in the claſs xvii. This order in Linnæus contains 10 genera. See AGARICUS, BOLETUS, CLAVARIA, LYCOPERDON, &c.

FUNGI, an order of plants in the *Fragmenta Methodi Naturalis* of Linnæus. See BOTANY, p. 470.

The ancients called fungi *children of the earth*, meaning, no doubt, to indicate the obſcurity of their origin. The moderns have likewiſe been at a loſs in what rank to place them; ſome referring them to the animal, ſome to the vegetable, and others to the mineral kingdom.

Meſſrs Wilck and Münchauſen have not ſcrupled to rank theſe bodies in the number of animal productions; becauſe, when fragments of them or their ſeeds were macerated in water, theſe gentlemen perceived a quantity of animalcules diſcharged, which they ſuppoſed capable of being changed into the ſame ſubſtance. It was the ancient opinion, that beef could produce bees; but it was reſerved for Meſſrs Wilck and Münchauſen to ſuppoſe, that bees could produce beef. Wilck aſſerts, that fungi conſiſt of innumerable cavities, each inhabited by a polype: and he does not heſitate to aſcribe the formation of them to their inhabitants, in the ſame way as it has been ſaid that the coral, the lichen, and the mucor, were formed. Hedwig has lately ſhown how ill founded this opinion is with reſpect to the lichen; and M. Durande has demonſtrated its falſity with regard to the corallines. "Indeed (ſays M. Bonnet, talking of the animality, of fungi) nothing but the rage for paradox could induce any one to publiſh ſuch a fable; and I regret that poſterity will be able to reproach our times with it. Obſervation and experiment ſhould enable us to overcome the prejudices of modern philoſophy; now, that thoſe of the ancient have diſappeared and are forgotten."

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* *De Leg.* l. 2.

It cannot be denied that the muſhroom is one of the moſt periſhable of all plants, and it is therefore the moſt favourable for the generation of inſects. Conſidering the quickneſs of its growth, it muſt be furniſhed with the power of copious abſorption; the extremity of its veſſels muſt be more dilated than in other plants. Its root ſeems, in many caſes, to be merely intended for its ſupport; for ſome ſpecies grow upon ſtones or moveable ſand, from which it is impoſſible that they can draw much nouriſhment. We muſt therefore ſuppoſe, that it is chiefly by the ſtalk that they abſorb. Theſe ſtalks grow in a moiſt and tainted air, in which float multitudes of eggs, ſo ſmall, that the very inſects they produce are with difficulty ſeen by the microſcope. Theſe eggs may be compared to the particles of the Byſſus, 100,000 of which, as M. Gleditſch ſays, are not equal to the fourth of a grain. May we not ſuppoſe, that a quantity of ſuch eggs are abſorbed by the veſſels of the fungus, that they remain there, without any change, till the plant begins to decay? Beſides, the eggs may be only depoſited on the ſurface of the plant, or they may exiſt in the water into which they are thrown for examination. Do not we ſee that ſuch eggs, diſperſed through the air, are hatched in vinegar, in paſte, &c. and wherever they find a convenient nidus for their developement? Can it be ſurpriſing then, that the corruption of the muſhroom ſhould make the water capable of diſcloſing certain beings that are really foreign to both?

It is not more eaſy to acquieſce in the opinions of thoſe naturaliſts who place the fungi in the mineral kingdom, becauſe they are found growing on porous ſtones, thence called *Lapides Fungarii*; which, however, muſt be covered with a little earth, and be watered with tepid water, in order to favour the growth. Such muſhrooms are no more the produce of the ſtone, than the lichen is of the rock to which it adheres, or the moſs of the tree on which it is found. We have only to obſerve the growth of muſhrooms, to be convinced, that this happens by developement, and not by addition or combination of parts as in minerals. The opinion of Boccone, who attributed them to an unctuous matter performing the function of ſeed, and acquiring extenſion by appoſition of ſimilar parts; and that of Moriſon, who conceived that they grew ſpontaneouſly out of the earth by a certain mixture of ſalt and ſulphur, joined with oils from the dung of quadrupeds; have now no longer any adherents. Fungi are produced, they live, they grow, by developement; they are expoſed to thoſe viciſſitudes natural to the different periods of life which characteriſe living ſubſtances; they periſh and die. They extract, by the extremity of their veſſels, the juices with which they are nouriſhed; they elaborate and aſſimilate them to their own ſubſtance. They are, therefore, organized and living beings, and conſequently belong to the vegetable kingdom. But whether they are real plants, or only the production of plants, is ſtill a matter in diſpute with the ableſt naturaliſts.

Some ancient authors have pretended to diſcover the ſeed of muſhrooms; but the opinion was never generally received. Petronius, when he is laughing at the ridiculous magnificence of his hero Trimalcio, relates, that he had written to the Indies for the ſeed of the morelle.

Theſe productions were generally attributed to the ſuperfluous humidity of rotten wood, or other putrid ſubſtances. The opinion took its riſe from obſerving that they grew moſt copiouſly in rainy weather. Such was the opinion of Tragus, of Bauhin, and even of Columna, who, talking of the peziza, ſays, that its ſubſtance was more ſolid and harder, becauſe it did not originate from rotten wood, but from the *pituita* of the earth. It is not ſurpriſing that, in times when the want of experiment and obſervation made people believe that inſects could be generated by putrefaction, we ſhould find the opinion general, that fungi owed their origin to the putreſcence of bodies, or to a viſcous humour analogous to putridity.

Malpighi could not ſatisfy himſelf as to the exiſtence of ſeeds which other botaniſts had pretended to diſcover. He only ſays, that theſe plants muſt have them, or that they perpetuate themſelves and ſhoot by fragments. Micheli, among the moderns, appears to have employed himſelf moſt ſucceſsfully on this ſubject. He imagined, that he not only ſaw the ſeeds, but even the ſtamina, as well as the little tranſparent bodies deſtined to favour the diſſemination and the fecundation of theſe ſeeds. Before this author, Liſter thought he perceived ſeeds in the *Fungus poroſus craſſus magnus* of John Bauhin: the little round bodies that are found in the pezizæ and helvellæ, at that time, paſſed for ſeeds; which did not appear at all probable to Marſigli, conſidering that the eye, when aſſiſted with the very beſt microſcopes, could perceive nothing ſimilar in much larger fungi. Indeed theſe bodies may be the capſules or covers of the ſeeds, if they are not the ſeeds themſelves. However this may be, Marſigli, obſerving that fungi were often without roots or branches, and that they wanted flowers and ſeeds, the means with nature employs for the productions of perfect plants, thought himſelf warranted in doubting whether theſe beings could be ranked in the number of vegetables.

The doubts of Marſigli prompted him to obſerve the formation of fungi. Their matrix he called *Situs*: he imagined they grew in places where they met with an unctuous matter, compoſed of an oil mixed with nitrous ſalt, which, by fermentation, produced heat and moiſture, and inſinuated itſelf between the fibres of wood; that is, he imagined them the production of a viſcous and putreſcent humour. Lanciſi, in like manner, conſidered fungi as owing their exiſtence to the putrefaction of vegetables, and ſuppoſed them a diſeaſe in the plant; but he imagined, "that the fibres of the tree were neceſſary to their production," as is the caſe in the formation of galls; he compared them to the warts and other excreſcences of the human body. He added, that ſuch fungous vegetable tumours muſt neceſſarily aſſume various forms and figures, from the fluids which diſtend the tubes and veſſels relaxed by putreſcence, from the ductility of the fibres and their direction, and from the action of the air.

This opinion has been refuted by the celebrated naturaliſt M. de Juſſieu, in the Memoirs of the Academy of Sciences for the year 1728. He maintains, that the fungi have a great analogy with the lichen, which is allowed to be a vegetable; that, like the lichen, they are diveſted of ſtalk, branches, and leaves: that, like it, they grow and are nouriſhed upon the trunks of trees, on pieces of rotten wood, and on all ſorts of putrid vegetables; that they reſemble the lichen too in the rapidity of their growth, and the facility with which many of them may be dried and reſtored to their former figure, upon being immerſed in water; and, laſtly, that there is a great ſimilarity in the manner in which their ſeeds are produced. He affirms, that only the warts and excreſcences which grow on animal bodies, and the knots and other tumors that are to be found on trees, can be compared with one another; for they are compoſed equally of the ſolid and liquid ſubſtance of the plant or animal on which they grow; whereas, the matter of the fungi is not only quite diſtinct from that of the plants on which they are found, but often entirely ſimilar to the ſubſtance of thoſe that ſpring immediately from the earth.

The organization, ſays M. de Juſſieu, which diſtinguiſhes plants and other productions of nature, is viſible in the fungi; and the particular organization of each ſpecies is conſtant at all times and in all places; a circumſtance which could not happen if there were not an animal reproduction of ſpecies, and conſequently a multiplication and propagation by ſeed. This is not, he ſays, an imaginary ſuppoſition; for the ſeeds may be felt like meal upon muſhrooms with gills, eſpecially when they begin to decay; they may be ſeen with a magnifying glaſs, in thoſe that have gills with black margins: and, laſtly, ſays he, botaniſts can have no doubt that fungi are a diſtinct claſs of plants, becauſe, by comparing the obſervations made in different countries with the figures and deſcriptions of ſuch as have been engraven, the ſame genera and the ſame ſpecies are every where found.

Notwithſtanding this refutation by M. de Juſſieu, another naturaliſt, M. de Necker, has lately maintained, in his work intitled *Mycitologia*, That the fungi ought to be excluded from the three kingdoms of nature, and be conſidered as intermediate beings. He has obſerved, like Marſigli, the matrix of the fungi: and has ſubſtituted the word *carchte* (initium faciens) inſtead of *ſitus*; imagining that the rudiment of the fungus cannot exiſt beyond that point in which the developement of the filaments or fibrous roots is perceived. He allows, that fungi are nouriſhed and grow like vegetables; but he thinks that they differ very much from them in reſpect of their origin, ſtructure, nutrition, and rapidity of growth. He ſays, that the various veſſels which compoſe the organization of vegetables are not to be found in the fungi, and that they ſeem entirely compoſed of cellular ſubſtance and bark; ſo that this ſimple organization is nothing more than an aggregation of veſſels endowed with a common nature, that ſuck up the moiſture in the manner of a ſponge; with this difference, that the moiſture is aſſimilated into a part of the fungus. Laſtly, That the fructification, the only eſſential part of a vegetable, and which diſtinguiſhes it from all other organized bodies, being wanting, fungi cannot be conſidered as plants. This he thinks confirmed by the conſtant obſervation of thoſe people who gather the morelle and the muſhroom, and who never find them in the ſame ſpots where they had formerly grown. As the generation of fungi, ſays M. Necker, is always performed when the parenchymatous or cellular ſubſtance has changed its nature, form, and function, we muſt conclude that it is the degeneration of that part which produces theſe bodies.

But if fungi were owing merely to the degeneration of plants, they would be ſtill better intitled to conſtitute a new kingdom. They would then be a decompoſition, not a new formation or new bodies. Beſides, we cannot deny, that in thoſe bodies which form the limit between the animal and vegetable kingdoms, the organization becomes ſimple, as the organs deſtined for nutrition are multiplied; but, as the laſt in the claſs of inſects belongs to the animal kingdom. fungi ought, notwithſtanding the ſimplicity of their organization, ſtill to belong to the vegetable kingdom, The parenchymatous or cellular ſubſtance, which, as Mr Bonnet ſays, is univerſally extended, embraces the whole fibrous ſyſtem, and becomes the principal inſtrument of growth, muſt naturally be more abundant in theſe productions; and this accounts for the rapidity of their enlargement. Beſides, growth, whether ſlow or rapid, never was employed to determine the preſence or abſence of the vegetable or animal character, The *draba verna*, which in a few weeks ſhoots, puts forth its leaves, its flowers, and fruit, is not leſs a plant than the palm. The inſect that exiſts but for a day, is as much an animal as the elephant that lives for centuries. As to the ſeeds of the fungi, it is probable that nature meant to withdraw from our eyes the diſſemination of theſe plants, by making the ſeeds almoſt imperceptible; and it is likewiſe probable, that naturaliſts have ſeen nothing but their capſules. Since, however, from the imperfection of our ſenſes, we are unable to perceive theſe ſeeds, ought we to infer that they do not exiſt? Are we authorized to conclude this, becauſe we do not find muſhrooms where we have found them a year before? Undoubtedly not; for the greater part of plants require a particular ſoil, and the ſame mould that this year will foſter a rare plant, will next year allow it to periſh. Neither are we at liberty to deny the exiſtence of theſe ſeeds, becauſe thoſe bodies which have been called their ſeeds, and the fragments or cuttings of the plants themſelves, have not produced others of the ſame ſpecies. Nature ſeems to have reſerved for herſelf the care of diſſeminating certain plants: It is in vain, for inſtance, that the botaniſt ſows the duſt found in the capſules of the orchis, which every one allows to be the ſeed. But, after all, what are thoſe parts in the fungi caſually obſerved by naturaliſts, and which they have taken for the parts of fructification? Theſe are quite diſtinct from the other parts; and whatever may be their uſe, they cannot have been formed by a prolongation of the cellular ſubſtance, or of the fibres of the tree on which the fungus grows: they are, therefore, owing, like flower and fruit, to the proper organization of the plant. Theſe plants, therfore, have a particular exiſtence, independent of their putrefying nidus. The gills of certain fungi, which differ eſſentially from the reſt of the plant in their conformation, would be ſufficient to authorize this latter opinion. But can putrefaction create an organic ſubſtance?

Nature undoubtedly diſſeminates through the air, and over the ſurface of the earth, innumerable ſeeds of fungi, as well as eggs of inſects. The plant and the animal are excluded, when the nidus or the temperature is favourable for their developement. No fortuitous concourſe, either of atoms or fluids, could produce bodies ſo exquiſitively and ſo regularly organized. It is ſufficient to throw one's eyes on the beautiful plates which Schæffer has publiſhed of them, and compare them, by the glaſs, with the warts and other excreſcences of animals, to be convinced that they have not the ſame origin. The function of the cellular ſubſtance in vegetables muſt be greatly ſuperior to that in animals, if it could produce any thing but deformities.

The greater part of fungi exhibit a configuration much too regular, conſtant, and uniform, to be the effect of chance or putrefaction. As this form is preſerved the ſame in all places where fungi have been found, it follows, that they contain in themſelves the principles of their reproduction. They reſemble the miſletoe, and other paraſitic plants, which are perfectly diſtinct from the trees on which they grow. The fungi, therefore, are organized and living ſubſtances, or true plants. If the manner of their production is unknown, that of ſome inſects is ſo too.

FUNGIBLES, in Scots law, are ſuch things as are eſtimated by number, weight, or meaſure; as, coin, butter, ale, &c.

FUNGITÆ, in natural hiſtory, a kind of foſſile coral, of a conic figure, though ſometimes flatted and ſtriated longitudinally.

FUNGUS, in ſurgery, denotes any ſpongy excreſcence. See SURGERY.

FUNNEL *of a* CHIMNEY, the ſhaft or ſmalleſt part of the waſte, where it is gathered into its leaſt dimenſions.

Palladio directs, that the funnels of chimneys be carried through the roof four or five feet at leaſt, that they may carry the ſmoke clear from the houſe into the air. See the article CHIMNEY.

He alſo adviſes, that chamber chimneys be not made narrower than 10 or 11 inches, nor broader than 15: for if too narrow, the ſmoke will not be able to make its way; and, if too wide, the wind will drive it back into the room.

FUR, or FURR, in commerce. See FURR.

FURBISHER, a perſon who furbiſhes, poliſhes, or cleans arms, as guns, ſwords, piſtols, &c.; which is chiefly performed with emery. See the article EMERY.

FURCA, in antiquity, a piece of timber reſembling a fork, uſed by the Romans as an inſtrument of puniſhment.

The puniſhment of the furca was of three kinds: the firſt only ignominious, when a maſter, for ſmall offences, forced a ſervant to carry a furca on his ſhoulders about the city. The ſecond was penal, when the party was led about the circus, or other place, with the furca about his neck, and whipped all the way. The third was capital, when the malefactor having his head faſtened on the furca, was whipped to death.

FURCHE, in heraldry, a croſs forked at the ends.

FURETIERE (*Antony*), an ingenious and learned Frenchman, was born at Paris in 1620; and after a liberal education became eminent in the civil and canon law. He was firſt an advocate in the parliament; and afterwards taking orders, was preſented with the abbey of Chalivoy, and the priory of Chuines. Many works of literature recommended him to the public: but what he is chiefly known by and valued for, is his Univerſal Dictionary of the French Tongue, in which he explains the terms of art in all ſciences. He had not, however, the pleaſure of ſeeing this uſeful work publiſhed before his death; which happened in 1688. He was of the French academy; and the diſputes and quarrels which he had with certain members of it made a great noiſe in the world.

FURIA, in zoology, a genus of inſects belonging to the order of vermes zoophyta. There is but one ſpecies, viz. the infernalis. This has a linear ſmooth body ciliated on each ſide, with reflexed feelers preſſed to its body. In Finland, Bothnia, and the northern provinces of Sweden, it was not unfrequently that people were ſeized with a pungent pain, confined to a point, in the hand or other expoſed part of the body, which preſently increaſed to a moſt excruciating degree, and hath ſometimes been ſuddenly fatal. This diſorder was more particularly obſerved in Finland, eſpecially about boggy and marſhy places, and always in autumn. At length it was diſcovered that this pain inſtantly ſucceeded ſomewhat that dropped out of the air, and in a moment penetrated and buried itſelf in the fleſh. The Finlanders had tried a variety of applications to no purpoſe, until at length a poultice of curds or cheeſe was found the moſt effectual in eaſing the pain: and the event confirmed that the inſect was allured by this application to leave the fleſh; as, on its removal, this worm, no longer than the ſixth of an inch, was found in it, and thus the cauſe of this painful diſeaſe explained. But by what means this creature is raiſed into the air, is as yet unknown.

FURIES, in Pagan antiquity, certain goddeſſes whoſe office it was to puniſh the guilty after death. They were three in number: Alecto, Megæra, and Tiſiphone; who were deſcribed with ſnakes inſtead of hair, and eyes like lightning, carrying iron chains and whips in one hand, and in the other flaming torches; the latter to diſcover, and the former to puniſh, the guilty: and they were ſuppoſed to be conſtantly hovering over ſuch perſons as had been guilty of any enormous crime.

Mythologiſts ſuppoſe, that Tiſiphone puniſhed the crimes which ſprang from hatred or anger; Megæra, thoſe from envy: and Alecto, thoſe from an inſatiable purſuit after riches and pleaſure. They were worſhipped at Caſina in Arcadia, and at Carmia in Peloponneſus. They had a temple at Athens near the Areopagus,

gus, and their prieſts were choſen from amongſt the judges of that court. At Telphuſia, a city in Arcadia, a black ewe was ſacrificed to them.

FURIUS (Bibaculus), a Latin poet who flouriſhed about 103 B. C. He wrote annals in verſe, of which Macrobius recites ſome fragments. Suetonius alſo relates ſome verſes of his on Valerius Cato, in his Illuſtrious Grammarians.

FURLING, in the ſea language, ſignifies the wrapping up and binding any ſail cloſe to the yard; which is done by hawling upon the clew-lines, bunt-lines, &c. which wraps the ſail cloſe together, and being bound faſt to the yard the ſail is furled

FURLONG, a long meaſure, equal to one eighth of a mile, or 40 poles.

It is alſo uſed in ſome law-books for the eighth part of an acre.

FURLOUGH, in the military language, a licence granted by an officer to a ſoldier, to be abſent for ſome time from his duty.

FURNACE, an utenſil or veſſel proper to contain fire, or to raiſe and maintain a vehement fire in, whether of coal or wood. Of theſe there are a great variety, according to the different uſes to which they are applied.

In all furnaces the principal things to be attended to are, 1. To confine the heat as much as poſſible to the matter to be operated upon; 2. To prevent its being diſſipated; 3. To produce as much heat with as little fuel as poſſible; and, 4. To have it in our power to regulate the degree of heat according to our pleaſure.

To anſwer the firſt intention, the fire is uſually confined in a chamber or cavity built on purpoſe for it, and furniſhed with a door for putting in the fuel; a grate for ſupporting it, and allowing air to paſs thro', as well as the aſhes to drop down into a cavity provided on purpoſe, and called the *aſh-pit*. Thus the heat produced by the inflamed fuel is confined by the ſides of the furnace, and obliged to ſpend great part of its force upon the ſubject incloſed.

The ſecond intention, *viz.* to prevent the diſſipation of the heat, is obtained by ſhutting the door of the furnace; taking care that the chimney be not too wide, and that the matter to be acted upon be placed in ſuch a manner that the fire may have its full effect upon it as it goes up the chimney.

The third intention, which is the moſt important, is at the ſame time the moſt difficult to anſwer, and depends entirely upon the proportion between the ſpaces betwixt the furnace bars and the wideneſs and height of the chimney. This will appear from a conſideration of the principles on which the degrees of inflammation are produced. Theſe depend entirely on the current of air which paſſes through the inflamed fuel. As ſoon as the fuel is ſet on fire, a certain degree of heat is produced; but unleſs a conſtant influx of air is admitted through the burning fuel, the fire is inſtantly extinguiſhed; nor is it poſſible by any means to renew the inflammation until we admit a ſtream of freſh air among the fuel. When this is done, a rarefaction commences in the air of the fire-place of the furnace; ſo that it is no longer a counterpoiſe to the external air, and is therefore driven up the chimney by that which enters at the aſh-pit. This again paſſing through the fuel, is rarefied in its turn; and giving place to freſh quantities, there is a conſtant flow of air up the chimney. In proportion to the rarefaction of the air in the fire-place, the greater is the heat. But by a certain conſtruction of the furnace, the under part of the chimney will become almoſt as ſtrongly heated as the fire-place; by which means, though a very ſtrong current of air is forced through the fuel; yet as great part of the heat is ſpent on the chimney, where it can be of no uſe, the fuel is waſted in a very conſiderable degree. To avoid this, we have no other method than to contract the throat of the chimney occaſionally by a ſliding plate; which when put quite in, ſhuts up the whole vent; and by being drawn out more or leſs, leaves a larger or ſmaller vent at pleaſure. This plate ought to be quite drawn out till the fuel is thoroughly kindled, and the furnace well heated, ſo that a current of air may flow ſtrongly through the fuel. After this the plate is to be put in a certain length, ſo as juſt to prevent the ſmoke from coming out at the door of the furnace. The rarefaction of the air in the fire-place will ſolicit a very conſiderable draught of air, which will keep the fuel inflamed to a great degree; at the ſame time that the heat, being reflected from every part of the furnace excepting that narrow paſſage where the ſmoke goes up, becomes very intenſe. A large quantity of fuel may be put in at once, which will conſume ſlowly, and thus require but little attention in compariſon with thoſe furnaces where no ſuch precaution is uſed. The ſliding-plate may be made of caſt-iron in thoſe furnaces where no great heat is excited; but in others fire-clay will be more convenient. The contrivance, however, is ſcarce applicable to thoſe furnaces where great quantities of metal are to be melted; and accordingly the waſte of fuel there is immenſe. It is computed, that the iron works of Carron in Scotland conſume annually as many coals as would be ſufficient for a city containing 700,000 inhabitants.

The fourth intention, *viz.* that of regulating the heat, is accompliſhed by allowing only a certain quantity of air to paſs through the fuel. For this purpoſe, according to Dr Black, it is neceſſary to have the command of the furnace below; the parts above being frequently filled with ſmall quantities of ſoot. The beſt method of managing this is to ſhut up the door of the aſh-hole perfectly cloſe, and to have a ſet of round holes bearing a certain proportion to one another; and their areas being as 1, 2, 4, 8, 16, &c. Seven or eight of theſe ought to be made in the door of the aſh-pit, which will give a ſufficient command over the fire. When the fire is to be increaſed to the utmoſt, all the paſſages both above and below are to be thrown open, and the height of the vent augmented; which, by increaſing the height of the column of rarefied air, increaſes alſo the motion of that through the fuel, and of conſequence alſo the heat of the furnace. Macquer recommends another tube applied to the aſh-pit, wideſt at the end fartheſt from the furnace, and tapering gradually towards it. The intention of this is to augment the current and velocity of the air by its being made to paſs from a wider into a narrower vent; but though this is no doubt true, the air will not ultimately move with greater velocity than if the tube were not there. It can only be uſeful therefore in caſes where the furnace is placed in a ſmall room, and the tube itſelf has a communication with the external air.

Pl. CCIV. fig. 1. *Cramer's Art of Eſſaying.* An *Eſſay* or *Cupelling* Furnace is made in the following manner. 1. Make with iron plates a hollow quadrangular priſm, eleven inches broad and nine inches high (*aa*, *bb*), ending at top in a hollow quadrangular pyramid (*bb*, *cc*) ſeven inches high terminating in an aperture at top ſeven inches ſquare. This priſm muſt be cloſed at bottom with another iron plate, which ſerves as a baſis or bottom to it (*aa*). 2. Near the bottom make a door (*e*), three inches high, and five inches broad, that leads to the aſh hole. 3. Above this door and at the height of ſix inches from the baſis, make another door (*f*), of the figure of a ſegment of a circle, four inches broad at its baſis, and three inches and a half high in the middle. 4. Then faſten three iron plates on the forepart of this furnace. Let the firſt of them (*gg*), eleven inches long and half an inch high, be faſtened, ſo that its lower edge ſhall reſt againſt the bottom of the furnace, with three or four rivets; and in ſuch a manner, that there may be between the upper edge of the ſaid plate and the ſide of the furnace a groove ſo wide, as that the ſliders of the lower door (*kk*) may be put into it, and freely move backwards and forwards therein: theſe muſt be made of a thicker iron-plate. The ſecond iron-plate (*hh*), eleven inches long, three inches high, and perfectly parallel to the foregoing plate, muſt be faſtened in the ſpace between the two doors, in ſuch manner that both the upper and lower edges of it may form a hollow groove with the ſide of the furnace. One of theſe grooves, which is turned downwards, ſerves to receive the upper edge of the ſliders that ſhut the lower door (N° 2). The other, that turns upwards, is to receive the inferior edges of the ſliders of the ſmall door above (N°. 3). The third plate (*ii*), which is like the firſt, muſt be riveted cloſe above the upper door, in ſuch manner, that it may form a groove turning downwards, and contiguous to the upper edge of the upper door (N° 3). 5. In order to ſhut both doors (N° 2, 3.), you muſt adapt to each of them two ſliders made of iron-plates, that may move within the abovementioned grooves (*kk*, *ll*.) But the two ſliders belonging to the upper door (N°. 3.) muſt have each a hole near the top; that is, one a ſmall hole one fifth part of an inch broad, and one inch and a half long (*m*); and the other a ſemicircular aperture, one inch high and two inches broad (*n*). Let, beſides, each ſlider have a handle, that they may be laid hold of when they are to be moved. 6. Moreover, let five round holes, one inch broad, be bored in the furnace; two of which muſt be made in the fore-part of the furnace (*oo*), two others in the back part; all at the height of five inches from the bottom, but three inches and a half diſtant from each ſide of the furnace; and, finally, a fifth hole (*p*), at the height of one inch above the upper edge of the upper door (*f*). 7. In ſhort, let the inſide of the furnace be armed with iron-hooks, jetting out half an inch, and about three inches diſtant from each other, to faſten the lute with which the furnace is to be covered over within. 8. Let then an iron, moveable, hollow, quadrangular pyramid (*g*), three inches high, be adapted to the upper aperture (*d*) of the furnace, at the baſis ſeven inches broad, ending upwards in a hollow tube (*r*), three inches in diameter, two inches high, almoſt cylindrical, though ſomewhat convergent at top. This prominent tube ſerves to ſupport a funnel or flue, which is almoſt cylindrical, hollow, made of iron plates, and two feet high; and which, when a very ſtrong fire is required, is put perpendicularly upon the ſhorter tube, in ſuch a manner, that it enters cloſe into it, one inch and a half or two inches deep, and may again be taken off at pleaſure, when there is no need of ſo ſtrong a fire. But this pyramidal cover (*q*) muſt beſides have two handles (*ss*) adapted to it, that it may be laid hold of, and thus be taken away or put on again: and that this, being put on the aperture (*d*) of the furnace, may not be eaſily thrown down, let an iron plate be riveted to the right and left upper edge of the furnace (*cc*), and be turned down towards the inſide, ſo as to make a furrow open before and behind, into which the lateral edges of the cover may enter and be faſtened, and at pleaſure be moved backwards and forwards, whenever it muſt be put on, or moved. 9. Let a ſquare ledge, made of a thick iron-plate, be faſtened at top of the upper edge of the lower door (*e*): this is deſigned to ſupport the grate and the lute; but it it muſt be made of two pieces, that it may be eaſily introduced into the cavity of the furnace. Thus you will have an aſſay-oven, which muſt afterwards be covered over on the inſide with lute. This you are to do as follows:

That the fire may be better confined, and that the iron may not be deſtroyed by growing red-hot, the whole inſide of the furnace muſt be covered over with lute, one finger or one finger and a half thick. The lute fit for this is deſcribed under the article Chemistry, n° 604, 605. But before you cover the inſide of your furnace with this lute, you muſt firſt put within the furnace ſmall iron bars, equal in length to the diameter of the oven, quadrangular, priſmatical, half an inch thick, having their extremities ſupported by a ſquare iron ledge, and three fourths of an inch diſtant from each other; and you muſt faſten them ſo, that their flat ſides may be oblique with regard to the tranſverſe ſection of the furnace, and that the two oppoſite angles may look one upwards and the other downwards: the bars muſt not be laid flat, but edgewiſe; by which ſituation you hinder the aſhes of the fuel of the fire from being detained too long between the interſtices of the ſaid iron bars, and from making an obſtruction that would oppoſe the free draught of the air. The furnace being then covered over with lute, and dried up by a gentle heat, is at laſt fit for docimaſtical operations, and eſpecially for ſuch as muſt be performed in the aſſay-oven.

If then an operation is to be made in the furnace hitherto deſcribed, you muſt let through the four lower holes above deſcribed of the furnace (*oo*) placed before and behind, and directly oppoſite to each other, two iron-bars one inch thick, and long enough that their extremities on every ſide may jut out of the holes a ſmall matter. Theſe ſerve to ſupport the muffle and its bottom. You then introduce the muffle through the upper aperture of the furnace (*d*), and place it upon the above deſcribed iron-bars, in ſuch a manner, that the open fore-ſide of it be contiguous to the inward

ward border of the upper door (*f*). The fuel of the fire is introduced through the top of the furnace (*d*); the cover of which (*g*), on this account, muſt be moveable, and not very heavy. The beſt fuel for the fire is charcoal made of the hardeſt wood, eſpecially of beech, broken into ſmall pieces of the bigneſs of an inch, wherewith the muffle muſt be covered over ſome inches high. We then reject larger bits of coals, becauſe they cannot fall through the narrow interſtices, between the ſides of the muffle and thoſe of the furnace, and cannot of courſe ſufficiently ſurround the circumference of the muffle. Whence it happens, that there are on every ſide places void of fuel, and the fire is either not ſtrong enough or unequal. But if, on the contrary, you uſe coals too ſmall, then a great part fall immediately through the interſtices of the grate into the aſh-hole; and the tendereſt particles of them turn too ſoon into aſhes, and, by increaſing the heap of aſhes, obſtruct the free draught of the air, which is here greatly requiſite.

A perfect management of the fire is moſt commonly neceſſary in the performing of operations in this furnace; therefore the chemical reader muſt give attention to what follows. If the door of the aſh-hole (*e*) is quite open; and the ſliders of the upper door (*f*) drawn towards each other, ſo as to touch one another in the middle of the door; and if, beſides, the cover (*q*), and the funnel adapted to its tube (*r*), is upon the top (*q*) of the furnace; the fire will be then in the higheſt degree poſſible; though, in the mean time, it is hardly ever neceſſary to put the funnel on, except in a very cold ſeaſon: but if, after having diſpoſed the furnace in the manner juſt deſcribed, you put red burning coals into the open upper door (*f*) of it, the fire is ſtill more increaſed thereby: however, this artifice is never, or very ſeldom, neceſſary. When you ſhut the upper door with only that ſlider that has a narrow oblong hole in it (*m*), then the heat becomes a little leſs; but it diminiſhes ſtill more when you ſhut the door with the other ſlider that has in it the ſemicircular hole (*n*), which is larger than that of the firſt ſlider: nay, the heat again is leſs when you take away the funnel put at the top of the cover: finally, the door of the aſh-hole being either in part or totally ſhut, the heat is ſtill diminiſhed; becauſe the draught of air ſo neceſſary to excite the fire, is thereby hindered: but if, beſides all theſe, you likewiſe open the upper door quite, then the cold air, ruſhing into the muffle, cools the bodies put under it, that are to be changed, to a degree never required in any operation, and ſuch as will entirely hinder the boiling of lead. If, during the operation, the fire begins to decay, or to grow unequal, it is a ſign that there are places void of coals between the ſides of the furnace and thoſe of the muffle: therefore, in this caſe, you muſt ſtir your coals on every ſide with an iron-rod, which is to be introduced through the upper hole (*p*) of the furnace, that they may fall together, and thus act in a proper manner and equality.

However, you are to obſerve concerning the regimen of the fire juſt deſcribed, that though the apparatus is made with all the exactneſs mentioned, nevertheleſs the effect does not always anſwer it. The cauſe of which difference has moſt commonly its origin in the various diſpoſitions of the air: for as every fire is more excited by coals in proportion as the air, more condenſed, and more quickly agitated, ſtrikes them more violently (which the effect of the bellows plainly ſhows); it thence appears, that in warm and wet weather, when the atmoſphere is light, the fire muſt be leſs efficacious in furnaces; that likewiſe, when ſeveral furnaces, ſituated near each other, are burning at the ſame time, the fire is in part ſuffocated, becauſe the ambient air is thereby rendered more rare and lighter. The ſame effect is produced by the ſun, eſpecially in ſummer-time, when it ſhines upon the place where the furnace is ſituated. The atmoſphere, on the contrary being heavier in cold dry weather, excites a very great fire.

The heat of the fire acts the ſtronger upon the bodies to be changed, as the muffle put in the furnace is leſs; as the ſaid muffle has more and larger ſegments cut out of it; as the ſides of this muffle are thinner; in ſhort, as there are more veſſels placed in the hinder part of the muffle; and on the contrary. In this caſe, when many of the conditions requiſite for the exciting of fire are wanting, then indeed the artificer, with all his ſkill, will hardly be able to excite the fire to a ſufficient degree, in order to perform operations well, in common aſſay-ovens, even though he uſes bellows, and puts coals into the upper door of the furnace. For this reaſon, the grate ought to be put almoſt three inches below the muffle, leſt the air, ruſhing through the aſh-hole, ſhould cool the bottom of the muffle, which happens in common aſſay-ovens; and again, that the ſmaller coals, almoſt already conſumed, and the aſhes, may more eaſily fall through the interſtices of the grate, and the larger coals ſtill fit to keep up the fire be retained. Laſtly, The above-mentioned funnel is added, that the blowing of the fire being, by means of it, increaſed as much as poſſible, this might at laſt be carried to the requiſite degree; for the fire may always be diminiſhed, but not always be increaſed at pleaſure, without the aſſiſtance of a proper apparatus.

Fig. 2. Repreſents a longitudinal ſection of a *Reverberatory* FURNACE uſed in the ſmelting of ores. 1. The maſonry. 2. The aſh-hole. 3. A channel for the evaporation of the moiſture. 4. The grate. 5. The fire-place. 6. The inner part of the furnace. 7. A baſon formed of ſand. 8. The cavity where the melted metal is. 9. A hole through which the ſcoria is to be removed. 10. The paſſage of the flame and ſmoke, or the lower part of the chimney; which is to be carried up to a height of about 30 feet. 11. A hole in the roof, through which the ore is thrown into the furnace. This furnace is 18 feet long, 12 feet broad, and 9½ high.

Fig. 3. Repreſents a longitudinal ſection of the *Refining* FURNACE. 1. The maſonry of the pillars and walls ſurrounding the furnace. 2. The channels for carrying off the moiſture. 3. Other ſmall channels which join in the middle of the baſon. 4. The baſon made of bricks. 5. A bed of aſhes. 6. The hollow or baſon in which the metal is melted and refined. 7. The great flame-hole. 8. The two openings for the entry of the tuyeres of the bellows. 9. The vault or dome of the furnace. 10. The fire-place. 11. The grate. 12. The draught hole. 13. A hole in the vault, which, being opened, ſerves to cool the furnace.

Portable FURNACE. See CHEMISTRY, nº 600, &c.

Melting FURNACE. See CHEMISTRY, nº 2d 605, 606.

Lamp FURNACE. *Ibid* 611.

Machines for Blowing Air into FURNACES. The earlieſt method of animating large fires in the furnaces where ores were ſmelted, ſeems to have been by expoſing them to the wind. Such was the practice of the Peruvians before the arrival of the Spaniards among them. Alonſo Barba relates, that their furnaces, called *guairas*, were built on eminences, where the air was freeſt; that they were perforated on all ſides with holes, through which the air was driven in when the wind blew, which was the only time when the work could be carried on; that under each hole was made a projection of the ſtone-work, on which were laid burning coals, to heat the air before it entered the furnace. Some authors ſpeak of ſeveral thouſands of theſe guairas burning at once on the ſides and tops of the hills of Potoſi; and ſeveral remains of this practice are to be found in different parts of Great Britain.

This method of ſupplying air being found exceſſively ineffectual and precarious, the inſtruments called *bellows* ſucceeded. Theſe were at firſt worked by the ſtrength of men; but as this was found to be very laborious and expenſive, the force of running water was employed to give motion to theſe machines. Thus a much greater quantity of metal could be procured than formerly, and the ſeparation was likewiſe more complete; inſomuch, that in many places the ſlags or cinders from which the iron had formerly been extracted were again uſed as freſh ore, and yielded plenty of metal.

But though this method was found to be greatly preferable to the others, yet great improvements were ſtill wanted. In order to melt very large quantities of ore at a time, it was neceſſary to uſe bellows of an immenſe ſize; and in proportion to their ſize they ſtood in need of the more frequent and expenſive repairs. The oil, alſo, which the bellows required in large quantity, becoming rancid, was found to generate a kind of inflammable vapour, which ſometimes burſt the bellows with exploſion, and thus rendered them totally uſeleſs. A new method, therefore, of blowing up fires altogether free from the abovementioned inconveniences, was fallen upon by means of water. It depends on the following principle, viz. That a ſtream of water, running through a pipe, if by any means it is mixed with air at its entrance into the pipe, will carry that air along with it, and part with it again as ſoon as it comes out of the pipe; and if the air is then collected by a proper apparatus, it may with ſucceſs be uſed for exciting the moſt violent degrees of heat.

Machines of this kind are repreſented on Plate CCIV. fig. 4. In the right hand machine, AB repreſents a ſtream of water falling into the funnel, whoſe throat is contracted at B; after which the ſtream runs through the perpendicular pipe EF, in the upper part of which there are ſome ſmall holes repreſented by *cdef*. Thro' theſe holes the air has acceſs to mix itſelf with the deſcending water, which being daſhed againſt the ſides of the pipe is reduced to froth, and thus fills the whole cavity of the pipe EF, which is conſiderably larger than the throat of the funnel B. When this frothy ſtream enters the veſſel C, the air extricates itſelf from the water; and as it cannot return through the pipe EF becauſe it is continually filled with a ſtream of liquid matter, it flies off with conſiderable force through the ſmller pipe D, by which it is conveyed to the furnace.

From this deſcription, it is evident that the principal thing to be kept in view in the conſtruction of theſe machines is, to mix the deſcending ſtream of water with as great a quantity of air as poſſible. For this purpoſe the contrivance repreſented in the left-hand machines anſwers much better than the former. By this the water deſcending from the reſervoir A, falls into a kind of cullender B, perforated with a great number of holes in its ſides. Thus the water being forced out in a number of ſmall ſtreams is very effectually daſhed againſt the ſides of the wide deſcending pipe, when it enters the condenſing veſſel C, and is ſent off by the pipe D, as in the former.

In ſome machines of this kind the conſtructors ſeem to have been of opinion, that a great height was required in the water-fall; but Dr Lewis, who hath made a great number of experiments upon the ſubject, ſhows, that an exceſs in height can never make up for a deficiency in the quantity of the water. Four or five feet, he thinks, is a ſufficient height for the water-fall; where there is a greater height, however, it may be rendered uſeful, by joining two or more machines together in the manner repreſented in the plate; where the water, after having once emitted its air in the condenſing veſſel C, flows out into a new reſervoir E. From thence it deſcends through another cullender F, and deſcending from it into a condenſing veſſel G, the air is extricated, and carried off through the pipe H. The upper figure repreſents the cullender, with the ſhapes of the holes and their proportional diſtances, according to Dr Lewis.

Phil. Com. of Arts, p. 267.

Thus, with very little expence, where there is a ſufficient quantity of water, as ſtrong a blaſt of air as can be deſired may be readily obtained; for ſeveral machines may be conſtructed, and joined together in a manner ſomewhat ſimilar to that abovementioned, until all the quantity of water is employed. It is proper to obſerve, however, that as by this method the air is loaded with moiſture, it is proper to make the condenſing veſſel as high as conveniently may be, that the air may arrive at the furnace in as dry a ſtate as poſſible.—The long ſlender pipes in the left hand machines repreſent a gage filled with mercury or water, by which the ſtrength of the blaſt may be determined.

In the large iron founderies another method is uſed for blowing up the fires by means of a kind of air-pumps. Theſe conſiſt of caſt-iron cylinders of about three feet diameter, exactly fitted with a piſton moved up and down by means of a water-wheel. In the bottom of the cylinder is a large valve like that of a bellows, which riſes as the piſton is lifted up, and thus admits the air into the cavity of the cylinder from below. Immediately above the bottom is a tube which goes to the furnace; and as it proceeds from the cylinder is furniſhed with a valve opening outward. Thus, when the piſton is drawn up, the valve in the bottom riſes and admits the air that way into the cylinder; while the lateral valve ſhuts, and prevents any air from getting into it through the pipe. When the piſton is thruſt down, the valve in the bottom ſhuts, while the air being compreſſed in the cavity of the cylinder is violently forced out through the lateral tube into

Fig. 1

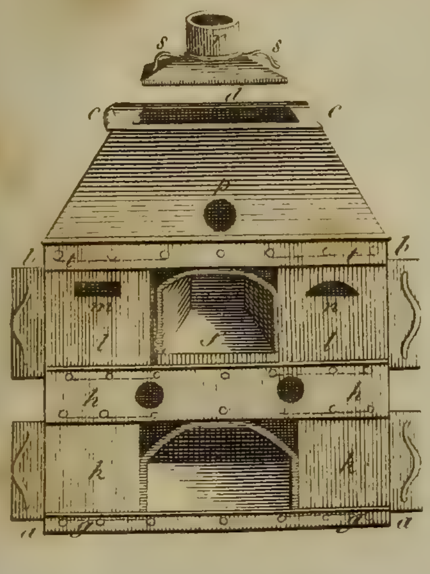


Fig. 2

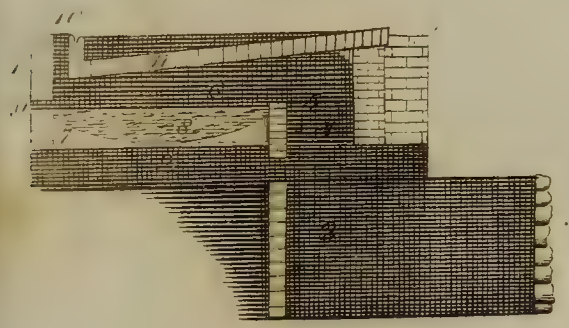
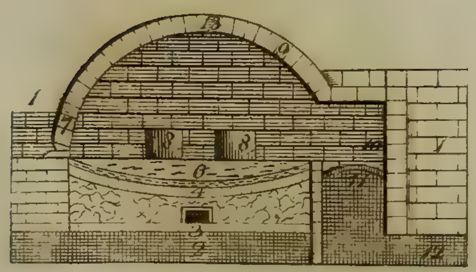
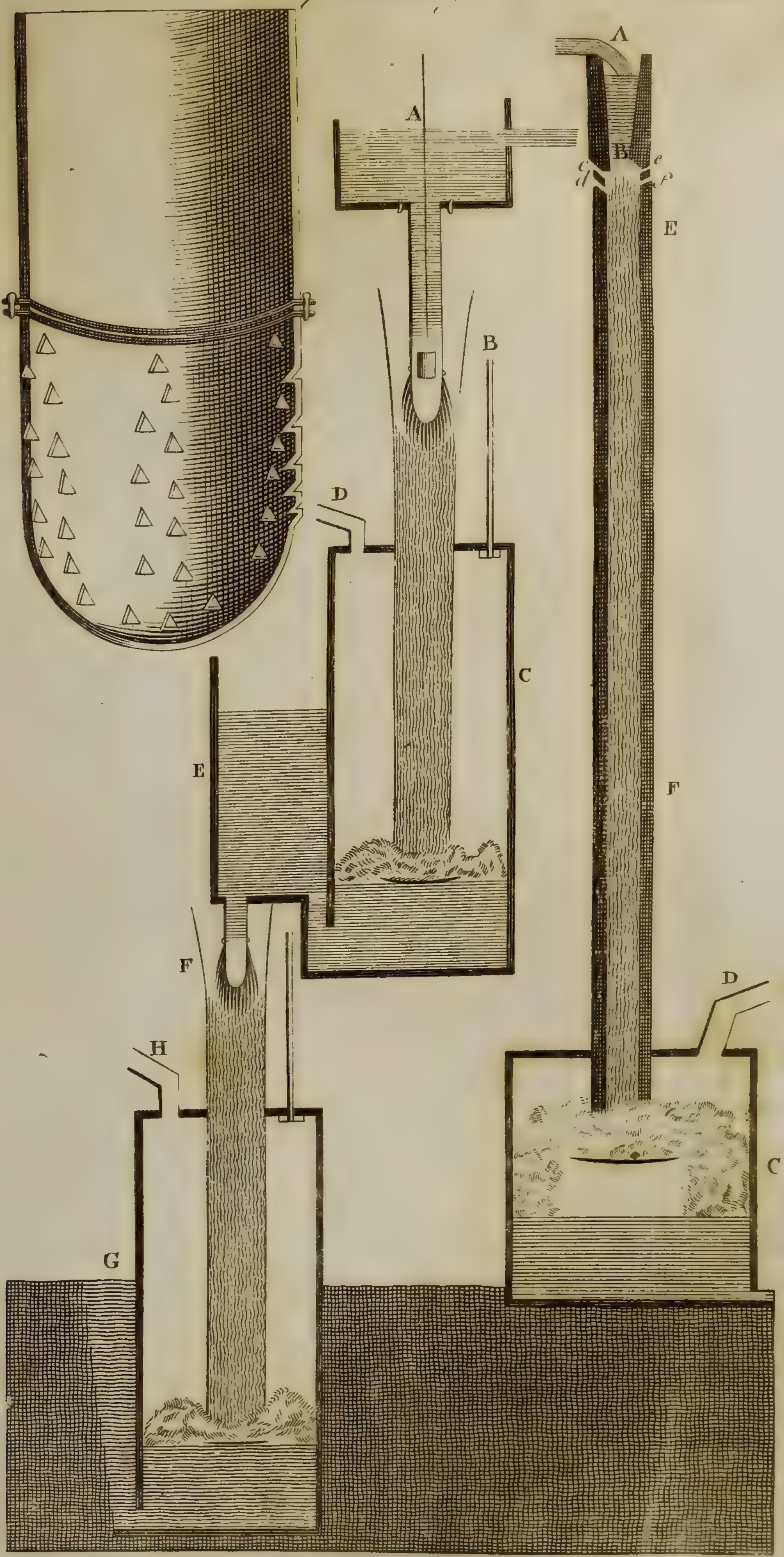


Fig. 3



Machines for blowing air into Furnaces



the furnace. In the great foundery at Carron, four of theſe large cylinders were a few years ago employed at their principal furnace, and ſo contrived that the ſtrokes of the piſtons, being made alternately, produced an almoſt uninterrupted blaſt. Some little intermiſſion might indeed be perceived by the ear, but it was too trifling to produce any ſenſible effect on the heat of the furnace. Even this could have been prevented by means of a large reſervoir into which all the four cylinders might diſcharge their blaſt. This ſhould be furniſhed with an heavy piſton; whoſe weight being ſupported by the air of the cylinder alone, would force it out through its lateral tube in a manner perfectly equable, without any of that puffing or interruption in the blaſt, perceptible though but in a ſmall degree in the other.

FUROR uterinus, a diſorder peculiar to women. See Medicine-*Index*.

FURR, in commerce, ſignifies the ſkin of ſeveral wild beaſts, dreſſed in alum with the hair on; and uſed as a part of dreſs, by princes, magiſtrates, and others. The kinds moſt in uſe are thoſe of the ermine, ſable, caſtor, hare, coney, &c. See Mustela.

It was not till the later ages that the furs of beaſts became an article of luxury. The more refined nations of ancient times never made uſe of them: thoſe alone whom the former ſtigmatiſed as barbarians were clothed in the ſkins of animals. Strabo deſcribes the Indians covered with the ſkins of lions, panthers, and bears; and Seneca, the Scythians clothed with the ſkins of foxes and the leſſer quadrupeds. Virgil exhibits a picture of the ſavage Hyperboreans, ſimilar to that which the late circumnavigators can witneſs to in the clothing of the wild Americans, unſeen before by any poliſhed people.

> *Gens effræna virûm Riphæo tunditur Euro;*
> *Et pecudum fulvis velantur corpora ſetis.*

Moſt part of Europe was at this time in ſimilar circumſtances. Cæſar might be as much amazed with the ſkin-dreſſed heroes of Britain, as the celebrated Cook was at thoſe of his new-diſcovered regions. What time hath done to us, time, under humane conquerors, may effect for them. Civilization may take place: and thoſe ſpoils of animals, which are at preſent eſſential for clothing, become the mere objects of ornament and luxury.

It does not appear that the Greeks or old Romans ever made uſe of furs. It originated in thoſe regions where they moſt abounded, and where the ſeverity of the climate required that ſpecies of clothing. At firſt it conſiſted of the ſkins only, almoſt in the ſtate in which they were torn from the body of the beaſt; but as ſoon as civilization took place, and manufactures were introduced, furs became the lining of the dreſs, and often the elegant facing of the robes. It is probable that the northern conquerors introduced the faſhion into Europe. We find, that about the year 522, when Totila king of the Viſigoths reigned in Italy, the Suethons (a people of modern Sweden) found means, by help of the commerce of numberleſs intervening people, to tranſmit for the uſe of the Romans, *ſaphilinas pelles*, the precious ſkins of the ſables. As luxury advanced, furrs, even of the moſt valuable ſpecies, were uſed by princes as linings for their tents: thus Marco Polo, in 1252, found thoſe of the Cham of Tartary lined with ermines and ſables. He calls the laſt *Zibelines* and *Zambolines*. He ſays that thoſe and other precious furrs were brought from countries far north; from the *land of Darkneſs*, and regions almoſt inacceſſible by reaſon of moraſſes and ice. The Welſh ſet a high value on furrs as early as the time of Howel Dda, who began his reign about 940. In the next age, furrs became the faſhionable magnificence of Europe. When Godfrey of Boulogne and his followers appeared before the emperor Alexis Comnene, on their way to the Holy Land, he was ſtruck with the richneſs of their dreſſes, *tam ex oſtro quam auriſrigio et niveo opere harmelino et ex mardrino griſioque et vario*. How different was the advance of luxury in France from the time of their great monarch Charlemagne, who contented himſelf with the plain furr of the otter! Henry I. wore furrs; yet in his diſtreſs was obliged to change them for warm Welſh flannel. But in the year 1337 the luxury had got to ſuch a head, that Edward III. enacted, that all perſons who could not ſpend a hundred a-year ſhould abſolutely be prohibited the uſe of this ſpecies of finery. Theſe, from their great expence, muſt have been foreign furrs, obtained from the Italian commercial ſtates, whoſe traffic was at this period boundleſs. How ſtrange is the revolution in the furr-trade! The north of Aſia at that time ſupplied Europe with every valuable kind; at preſent is ſent, by means of the poſſeſſion of Hudſon's Bay, furrs, to immenſe amount, even to Turkey and the diſtant China.

New Voyages in Search of Furrs. During the late Captain Cook's laſt voyage to the Pacific Ocean, beſides the various ſcientific advantages to be derived from it, a new ſource of wealth was laid open to future navigators, by trading for furrs of the moſt valuable kind on the north-weſt coaſt of America. The firſt veſſel which engaged in the new branch of trade pointed out by that great navigator, was equipped by ſome gentlemen in China. She was a brig of 60 tons and 20 men, commanded by James Hanna. She ſailed from the Typa the end of April 1785; proceeded to the northward, along the coaſt of China; paſſed through Diemen's Straits, the ſouth end of Japan; and arrived at Nootka in Auguſt following. Soon after her arrival, the natives, whom Captain Cook had left unacquainted with the effects of fire-arms, tempted probably by the diminutive ſize of the veſſel (ſcarce longer than ſome of their own canoes) and the ſmall number of her people, attempted to board her in open day; but were repulſed with conſiderable ſlaughter. This was the introduction to a firm and laſting friendſhip. Captain Hanna cured ſuch of the Indians as were wounded; an unreſerved confidence took place; they traded fairly and peaceably; a valuable cargo of furrs was procured; and the bad weather ſetting in, he left the coaſt in the end of September, touched at the Sandwich Iſlands, and arrived at Macao the end of December of the ſame year.

Captain Hanna ſailed again from Macao in May 1786, in the ſnow Sea-Otter of 120 tons and 30 men, and returned to Macao in February 1787. In this ſecond voyage he followed his former track, and arrived at Nootka in Auguſt; traced the coaſt from thence as far as 53 degrees, and explored the extenſive ſound diſcovered a ſhort time before by Mr Strange, and called by him Queen Charlotte's Sound, the latitude of which is 51 degrees north, longitude 128 weſt.

The Snow Lark, Captain Peters, of 220 tons and 40 men, ſailed from Macao in July 1786. Her deſtination was Kamtſchatka (for which ſhe was provided with a ſuitable cargo of arrack, tea, &c.), Copper Iſlands, and the N. W. coaſt. Captain Peters was directed to make his paſſage between Japan and Corea, and examine the iſlands to the north of Japan, ſaid to be inhabited by hairy people; which, if Captain Cook had lived, would not have been left to the French to determine. No account having been received of this veſſel ſince her departure, there is every reaſon to fear ſhe has periſhed.

In the beginning of 1786, two coppered veſſels were fitted out at Bombay, under the direction of James Strange, Eſq; who was himſelf a principal owner. Theſe veſſels were, the ſnow Captain Cook of 300 tons, and ſnow Experiment of 100 tons. They proceeded in company from the Malabar coaſt to Batavia; paſſed through the Straits of Macaſſar, where the Experiment was run upon a reef, and was obliged to haul aſhore upon Borneo to repair; from thence they ſteered to the eaſtward of the Palaos Iſlands; made Sulphur Iſland; and arrived at Nootka the end of June following. From Nootka, where they left their ſurgeon's mate (Mackay) to learn the language and collect ſkins againſt their intended return (but who was brought away in the Imperial Eagle the following year), they proceeded along the coaſt to Queen Charlotte's Sound, of which they were the firſt diſcoveries; from thence in a direct courſe to Prince William's Sound. After ſome ſtay there, the Experiment proceeded to Macao (their veſſels being provided with paſſes by the governor-general of Goa): the Captain Cook endeavoured to get to Copper Iſland, but without ſucceſs, being prevented by conſtant weſt winds.

Two coppered veſſels were alſo fitted out by a ſociety of gentlemen in Bengal, viz. the ſnow Nootka of 200 tons, and the ſnow Sea Otter of 100 tons, commanded by John Mears and William Tipping, lieutenants in the royal navy. The Nootka ſailed in March 1786 from Bengal; came through the China Seas; touched at the Baſhees, where they were very civilly treated by the Spaniards, who have taken poſſeſſion of theſe iſlands; arrived at Oonalaſka the beginning of Auguſt; found there a Ruſſian galliot and ſome furriers; diſcovered accidentally near Cape Greville a new ſtrait into Cook's River, 15 leagues wide and 30 long; ſaw ſome Ruſſian hunters in a ſmall bay between Cape Elizabeth and Cape Bear; and arrived in Prince William's Sound the end of September. They determined wintering in Snug Corner Cove, lat. 60. 30. in preference to going to the Sandwich Iſlands, which ſeem placed by Providence for the comfort and refreſhment of the adventurers in this trade, and were frozen up in this gloomy and frightful ſpot from the end of November to the end of May. By the ſeverity of the winter they loſt their third and fourth mates, ſurgeon, boatſwain, carpenter, and cooper, and twelve of the fore-maſt men; and the remainder were ſo enfeebled as to be under the neceſſity of applying to the commanders of the King George and Queen Charlotte, who juſt at this time arrived in the ſound, for ſome hands to aſſiſt in carrying the veſſel to the Sandwich Iſlands, where, giving over all further thoughts of trade, they determined (after getting a ſea-ſtock of fiſh off Cape Edgecumbe) immediately to proceed. The Nootka arrived at Macao the end of October 1787.

The Imperial Eagle, Captain Barkley, fitted out by a ſociety of gentlemen at Oſtend, ſailed from Oſtend the latter end of November 1786; went into the bay of All Saints; from thence, without touching any where, to the Sandwich Iſlands, and arrived at Nootka the beginning of June; from thence to the ſouth, as far as 47° 30′, in which ſpace he diſcovered ſome good and ſpacious harbours. In the lat. of 47° 45′, loſt his ſecond mate, purſer, and two ſeamen, who were upon a trading party with the long-boat, and imprudently truſting themſelves aſhore unarmed, were cut off by the natives. This place ſeems to be the ſame that Don Antonio Mourelle calls the *Ilha de los Dolores*, where the Spaniards going aſhore to water, were alſo attacked and cut off.

The King George of 320, and the Queen Charlotte of 200 tons, commanded by Captains Portlock and Dixon, who ſerved under Captain Cook in his laſt voyage, were fitted out by a ſociety of gentlemen in England, who obtained a privilege to trade to the north-weſt coaſt of America, from the South-Sea and Eaſt India companies.

Thoſe veſſels ſailed from England the beginning of September 1785; touched at the Falkland Iſlands, Sandwich Iſlands, and arrived in Cook's River in the month of Auguſt. From thence, after collecting a few furrs, they ſteered in the end of September for Prince William's Sound, intending, it is ſaid, to winter there; but were prevented entering, by heavy ſtorms and extreme bad weather, which obliged them to bear away, and ſeek ſome other part of the coaſt to winter at. The ſtorms and bad weather accompanied them till they arrived off Nootka Sound, when they were ſo near the ſhore, that a canoe came off to them: but though thus near accompliſhing their purpoſe, a freſh ſtorm came on, and obliged them finally to bear away for the Sandwich Iſlands, where they remained the winter months; and returning again to the coaſt, arrived in Prince William's Sound the middle of May. The King George remained in Prince William's Sound; and during her ſtay, her long-boat diſcovered a new paſſage from the Sound into Cook's River. The Queen Charlotte proceeded along the coaſt to the ſouth; looked into Behring's Bay, where the Ruſſians have now a ſettlement; examined that part of the coaſt from 56 to 50°, which was not ſeen by Captain Cook, and which conſiſts of a cluſter of iſlands, called by Captain Dixon *Queen Charlotte's Iſlands*, at a conſiderable diſtance from the Main, which is thus removed farther to the eaſtward than it was ſuppoſed to be: ſome part of the continent may, however, be ſeen from the eaſt ſide of theſe iſlands; and it is probable, the diſtance does not any where exceed 50 leagues. On this eſtimation, Hudſon's Houſe, lat. 53° long. 106° 27′ weſt, will not be more than 800 miles diſtant from that part of this coaſt in the ſame parallel. It is therefore not improbable, that the enterpriſing ſpirit of the Canadian furriers may penetrate to this coaſt (the communication with which is probably much facilitated by lakes or rivers), and add to the comforts and luxutries of Europe this invaluable furr, which in warmth, beauty, and magnificence, far exceeds the richeſt furrs of Siberia. Queen Charlotte's iſlands are inhabited by a race of people differing in language, features, and manners, from all the other tribes of this coaſt. Among other peculiarities, they are diſtinguiſhed by a large inciſion in the under lip, in which is inſerted a piece of poliſhed wood, ſometimes ornamented with mother-of-pearl ſhell, in ſhape and ſize like a weaver's ſhuttle, which undoubtedly is the moſt effectual mode of deforming the human face divine that the ingenious depravity of taſte of any ſavage nation has yet diſcovered. Theſe ſhips, after diſpoſing of their furrs in China, were loaded with teas on account of the Engliſh company, ſailed from Wampoa the end of February, and arrived in England a ſhort time ſince, after an abſence of three years.

The year after the departure of the King George and Queen Charlotte, the ſame ſociety to which they belonged fitted out two other veſſels, viz. the Princeſs Royal of 60 tons, and the Prince of Wales of 200 tons, commanded by Captains Colnet and Duncan, the former of whom had ſerved under Captain Cook. Theſe veſſels left England in Auguſt 1786; touched at New Year's harbour on Staten Land, where they left an officer and 12 men to kill ſeals againſt the arrival of a veſſel which was to follow them from England; from thence they proceeded directly to Nootka, where they arrived the 6th of July, ſickly and in bad condition, and found here the Imperial Eagle, which had left Europe ſome months after them. Leaving Nootka, they ſteered along the ſhore to the northward, and ſoon after fell in with the Queen Charlotte.

In the beginning of 1788, Captain Mears ſailed again with two other veſſels, the Felice, which he commanded himſelf, and the Iphigenia, Captain Douglas, to Nootka Sound. Here he purchaſed of the chief of the diſtrict a ſpot, on which he built a houſe for his reſidence and more convenient intercourſe with the natives, hoiſting the Britiſh colours thereon, ſurrounding it with a breaſt-work, and mounting a three pounder on the front. Having ſo done, he ſent Mr Douglas in the Iphigenia to trade along the northern coaſt, while he himſelf proceeded to the ſouth; and by preſents to the chiefs obtained the ports Cox and Effingham, and the promiſe of an excluſive trade with the natives of the diſtrict, and alſo ſome other places, which he took poſſeſſion of in the name of the king. Captain Douglas likewiſe, by preſents to the chiefs of the countries he viſited, obtained ſimilar privileges, no other European veſſel having ſailed there before him.

On their return to Nootka, they found a veſſel finiſhed which the commander had laid down before his departure. This, which he named the North-weſt America, he left at Nootka with the Iphigenia, while he ſailed with a cargo of furrs in the Felice to China.

A few days after his arrival at China, two veſſels, the Prince of Wales and Princeſs Royal, came to Canton from their trading voyage abovementioned. Captain Mears, fearing a competition of intereſts might be injurious to both parties, propoſed a copartnerſhip, which was mutually agreed to; and another ſhip was purchaſed by the firm, and called the *Argonaut*. In the month of April 1789, Captain Mears gave Mr Colnet the command of the Princeſs Royal and Argonaut, which were loaded with ſtores and articles eſtimated ſufficient for three years trade, beſides ſeveral artificers, and near 70 Chineſe, who intended to become ſettlers on the north-weſt coaſt of America, under protection of the new company.

In the mean while, the Iphigenia, and North-weſt America (the veſſel built at Nootka) having wintered in Sandwich Iſlands, returned to Nootka in the latter end of April. Soon after which, two Spaniſh ſhips of war, under the command of Don Martinez, anchored in the ſound. For a few days mutual civilities paſſed between the Spaniſh captain and Mr Douglas; but at the end of about a week, Don Martinetz ſummoned the latter on board his own ſhip the Princeſſa, telling him he was his priſoner, and that the king of Spain had commanded him, Don Martinez, to ſeize all veſſels he ſhould find on that coaſt. He therefore inſtructed his officers to take poſſeſſion of the Iphigenia, which they accordingly did in the name of his Catholic majeſty; and the officers and crew were conveyed as priſoners on board the Spaniſh ſhips, where they were put in irons, and otherwiſe ill treated. Immediately after this, Don Martinez took poſſeſſion of the little ſettlement, hoiſting the ſtandard of Spain, and modeſtly declaring all the lands from Cape Horn to 60 degrees north latitude belonged to his maſter. To aggravate the inſult, he forcibly employed the crew of the Iphigenia in building batteries, &c. and offered no kind of violence to two American veſſels that were at the ſame time in the harbour. At this time the North-weſt America was ſent to explore the Archipelago of St Lazarus. On her return to Nootka ſhe met with a ſimilar treatment, and the ſkins ſhe had collected were ſeized, with the reſt of her cargo.

A few days after the Princeſs Royal (which we have mentioned as leaving Canton in company with the Argonaut) arrived. The Spaniſh commander, for reaſons that do not appear, ſuffered her to depart. The ſkins collected by the North-weſt America were ſhipped on board her for the benefit of her owner, and ſhe proceeded to trade in the neighbouring iſles. On the 3d of July, the Argonaut arrived at the Sound; and Don Martinez, after making every profeſſion of civility to Mr Colnet the commander, took poſſeſſion of the ſaid ſhip in the name of his maſter, and made priſoners of the crew. Soon after, the Princeſs Royal returning to receive inſtructions from Colnet, director of the Enterprize, was ſeized by the Spaniſh captain.

The crews of the Britiſh veſſels were differently diſpoſed of; ſome ſent to China by the American veſſels, and others to Spaniſh America: but the Chineſe were all detained, and employed in the mines which were opened on the lands purchaſed by Captain Mears. What theſe mines conſiſted of we are no where informed. Mr Colnet was ſo much affected at the failure of the enterprize as to be deprived of reaſon.

This, as ſoon as known, occaſioned a ſpirited repreſentation from the Britiſh court to that of Spain; at the ſame time that vigorous preparations were made for war in caſe adequate ſatisfaction ſhould be refuſed. Matters, however, were prevented from coming to extremities, by a compliance on the part of Spain, after many delays and much artifice of negociation, with the requiſitions of Britain: in conſequence of which, among other advantages unneceſſary to be here recited, the whole trade from California to China is completely laid open; and the Britiſh allowed the full exerciſe of navigation and commerce in thoſe parts of the world which were the ſubject of diſcuſſion.

In ſome accounts of the voyages abovementioned, the furr-trade in thoſe parts have been greatly magnified. In that publiſhed by Captain Portlock, however, this officer obſerves, that the gains hitherto have certainly not been 'enviably' great; tho' the merchants have no doubt found the trade lucrative.

FURSTENBURGH, a town and caſtle of Germany, the capital of the county of the ſame name, 30 miles north-weſt of Conſtance. E. Long. 8. 30. N. Lat. 47. 50.

FURTHCOMING, in law, the name of an action competent to any perſon who has uſed arreſtment in the hands of his debtor's creditor, for having the ſubject arreſted declared his property.

FURUNCULE, or Boil, in ſurgery, a ſmall reſiſting tumor, with inflammation, redneſs, and great pain, ariſing in the adipoſe membrane, under the ſkin. See Surgery.

FURZE, in botany. See Ulex.

FUSANUS, in botany: A genus of the monœcia order, belonging to the polygamia claſs of plants. The hermaphrodite calyx is quinquefid; there is no corolla; there are four ſtamina; the germen beneath; there are four ſtigmata; the fruit a plum.

FUSAROLE, in architecture, a moulding or ornament placed immediately under the echinus, in the Doric, Ionic, and Compoſite capitals.

FUSE, or Fuze, in artillery. See Fusee.

FUSEE, in clock-work, is that conical part drawn by the ſpring, and about which the chain or ſtring is wound; for the uſe of which, ſee Clock and Watch.

Fusee, or *Firelock*. See Musquet.

Fusee, *Fuze*, or *Fuſe*, of a bomb or grenado, is that which makes the whole powder or compoſition in the ſhell take fire, to do the deſigned execution.

Military Dict. voce *Laboratory.*

Fuzes are chiefly made of very dry beech-wood, and ſometimes of hornbeam, taken near the root. They are turned rough, and bored at firſt, and then kept for ſeveral years in a dry place; the diameter of the hole is about 1-4th of an inch; the hole does not come quite through, leaving about 1-4th of an inch at the bottom; and the head is made hollow, in the form of a bowl.

The compoſition for fuzes is ſaltpetre 3, ſulphur 1, and mealed powder 3, 4, and ſometimes 5. This compoſition is drove in with an iron-driver (whoſe ends are capped with copper to prevent the compoſition from taking fire), and equally hard as poſſible; the laſt ſhovel-full being all mealed powder, and two ſtands of quickmatch laid acroſs each other being drove in with it, the ends of which are folded up into the hollow top, and a cap of parchment tied over it till uſed.

When theſe fuzes are driven into the loaded ſhell, the lower end is cut off in a ſlope, ſo that the compoſition may inflame the powder in the ſhell: the fuze muſt have ſuch a length as to continue burning all the time the ſhell is in its range, and to ſet fire to the powder as ſoon as it touches the ground, which inſtantly burſts into many pieces. When the diſtance of the battery from the object is known, the time of the ſhell's flight may be computed to a ſecond or two; which being known, the fuze may be cut accordingly, by burning two or three, and making uſe of a watch or a ſtring by way of a pendulum to vibrate ſeconds.

FUSIBILITY, in natural philoſophy, that quality of bodies which renders them fuſible. Gold is more fuſible than iron or copper; but leſs ſo than ſilver, tin, and lead. Borax is frequently mixed with metals, to render them more fuſible.

FUSIL, in heraldry, a bearing of a rhomboidal figure, longer than the lozenge, and having its upper and lower angles more acute and ſharp than the other two in the middle. It is called in Latin *fuſus*, "a ſpindle," from its ſhape.

FUSILIERS, Fusileers, or *Fuzileers*, in the military art, are ſoldiers armed as the reſt of the infantry, but wearing caps like the grenadiers, though ſomewhat ſhorter. There are three regiments in the Britiſh ſervice: the royal regiment of Scots fuzileers raiſed in 1678; the royal regiment of Engliſh fuzileers raiſed in 1685; and the royal regiment of Welſh fuzileers raiſed in 1688-9.

FUSION, the ſtate of a body rendered fluid by fire. See Fluidity, and Chemistry-*Index*.

FUST, or Faustus, a citizen of Mentz, and one of the earlieſt printers. He had the policy to conceal his art; and to this policy we are indebted for the tradition of "The Devil and Dr Fauſtus," handed down to the preſent times. Fuſt, in partnerſhip with Peter Schoeffer, having in 1462 printed off a conſiderable number of copies of the Bible to imitate thoſe which were commonly ſold in MS. Fuſt undertook the ſale of them at Paris, where the art of printing was then unknown. At firſt he ſold his copies for ſo high a ſum as 500 or 600 crowns, the prices uſually demanded by the ſcribes. He afterwards lowered his price to 60 crowns, which created univerſal aſtoniſhment: but when he produced copies as faſt as they were wanted, and lowered the price to 30 crowns, all Paris was agitated. The uniformity of the copies increaſed the wonder; informations were given into the police againſt him as a magician; his lodgings were ſearched; and a great number of copies being found, they were ſeized: the red ink with which they were embelliſhed was ſaid to be his blood; it was ſeriouſly adjudged that he was in league with the devil; and if he had not fled, moſt probably he would have ſhared the fate of thoſe whom ignorant and ſuperſtitious judges condemned in thoſe days for witchcraft. See (Hiſtory of) Printing.

FUSTIAN, in commerce, a kind of cotton ſtuff, which ſeems as it were whaled on one ſide.

Right fuſtians ſhould be altogether made of cotton-yarn, both woof and warp; but a great many are made, the warp of which is flax, or even hemp.

There are fuſtians made of ſeveral kinds, wide, narrow, fine, coarſe; with ſhag or nap, and without it.

Fustian, is alſo uſed for a bombaſt-ſtyle, or a high ſwelling kind of writing made up of heterogeneous parts.

FUSTICK, or Fustock, a yellow wood, that grow in all the Caribbee iſlands, uſed in dying yellow. It pays no duty on importation into Britain. It is a ſpecies of Morus.

FUSTIGATIO, in the Roman cuſtoms, a puniſhment inflicted by beating with a cudgel. This puniſhment was peculiar to freemen: for the ſlaves were ſcourged or laſhed with whips.

FUTTOCKS, in a ſhip, the timbers raiſed over the keel, or the encompaſſing timbers that make her breadth.

FUTURE, ſomething to come hereafter. We ſay a *future* ſtate, a *future* contingency; there is none but God to whom *future* things are preſent.

Future, or *Future Tenſe*, in grammar, denotes an inflexion of verbs, whereby they denote, that a thing will be in ſome time yet to come. See Grammar.

FUZES, or Fusees, in artillery. See Fusee.

FUZILEERS. See Fusileers.

FYTT (John), a celebrated painter of animals and flowers, &c. was born at Antwerp about the year 1625, and proved one of the beſt artiſts of his time. He frequently painted in conjunction with Rubens, and Jordaens; and whatever ſubject he choſe to repreſent in the ſtyle which he adopted, was always deſigned and finiſhed in a maſterly manner. His general ſubjects were live and dead game, wild boars, hares, dogs, fruits, flowers, and birds, particularly partridges; which he deſcribed with ſurpriſing truth, nature, and ſtrength. He likewiſe imitated ſucceſsfully the bas relieves on vaſes of marble or porphyry: and gave uncommon freſhneſs to his fruits and flowers; and in objects of the animal kind, he deſcribed even the hairs of the animals and the plumage of his fowl with wonderful ſpirit, exactneſs, and freedom of pencil.

G.

G, THE ſeventh letter and fifth conſonant of our alphabet; though in the alphabets of all the oriental languages, the Hebrew, Phenician, Chaldee, Syriac, Samaritan, Arabic, and even Greek, *G* is the third letter. The Hebrews call it *ghimel* or *gimel*, *q. d.* "camel;" by reaſon it reſembles the neck of that animal; and the ſame appellation it bears in the Samaritan, Phenician, and Chaldee: in the Syriac it is called *gamel*, in Arabic *giim*, and in Greek *gamma*.

The gamma (Γ) of the Greeks is manifeſtly the gimel (ג) of the Hebrews or Samaritans. All the difference between the gamma and gimel conſiſts in this, that the one is turned to the right and the other to the left, according to the different manners of writing and reading which obtained among thoſe different nations; ſo that all the pains Salmaſius has taken on Solinus, to prove that the G was derived from the Greek kappa, is loſt.

From the Greeks the Latins borrowed their form of this letter; the Latin G being certainly a corruption of the Greek gamma Γ, as might eaſily be ſhown, had our printers all the characters and forms of this letter which we meet with in the Greek and Latin MSS. through which the letter paſſed from Γ to G.

Diomed, lib. ii. cap. *De Litera*, calls G a new letter. His reaſon is, that the Romans had not introduced it before the firſt Punic war; as appears from the roſtal column erected by C. Duilius, on which we every where find a C in lieu of G. It was Sp. Carvillus who firſt diſtinguiſhed between thoſe two letters, and invented the figure of the G; as we are aſſured by Terentius Scaurus. The C ſerved very well for G; it being the third letter of the Latin alphabet, as the Γ or γ was of the Greek.

The G is found inſtead of C on ſeveral medals: *Vaillant, Num. Imperat.* tom. i. p. 39.

M. Beger produces a medal of the *Familia Ogulnia*, where Gar is read inſtead of Car, which is on thoſe of M. Patin. But the C is more frequently ſeen on medals in lieu of G; as, Augustalis Callaecia Cartacinensis, &c. for Augustalis, &c. Not that the pronunciation of thoſe words were altered, but only that the G was unartfully or negligently cut by the workmen: as is the caſe in divers inſcriptions of the eaſtern empire; where auc, aucc, auccc, are frequently found for aug, &c.

The northern people frequently change the G into V or W; as in *Gallus, Wallus; Gallia, Wallia, Vallia,* &c. For in this inſtance it muſt not be ſaid that the French have changed the W into G; becauſe they wrote *Gallus* long before *Wallus* or *Wallia* was known, as appears from all the ancient Roman and Greek writers. And yet it is equally true, that the French change the W of the northern nations, and V conſonant, into G; as, *Willielmus*, "William," into *Guillaume*; *Wulphilas* into *Gulphilas*; *Vaſco* into *Gaſcon*, &c.

The letter G is of the mute kind, and cannot be any way ſounded without the help of a vowel. It is formed by the reflexion of the air againſt the palate, made by the tongue as the air paſſes out of the throat; which Martianus Capella expreſſes thus, *G ſpiritus cum palato*; ſo that G is a palatal letter.

The modern G takes its form from that of the Latins. In Engliſh it has two ſounds, one from the Greek Γ, and the Latin, which is called that of the hard *G*, becauſe it is formed by a preſſure ſomewhat hard on the fore-part of the tongue againſt the upper gum;

which ſound it retains before *a, o, u, l, r;* as *gate, go, gull.* At the end of a word it is always hard, as *ring, ſing,* &c. The other ſound, called that of the ſoft *G,* reſembles that of *j;* and is commonly, though not always, found before *e* and *i,* as in *geſture, giant,* &c. To this rule, however, there are many exceptions; *G* is often hard before *i,* as *give,* &c. and ſometimes before *e* as *get,* &c. It is alſo hard in derivatives from words ending in *g,* as *ſinging, ſtronger,* &c. and generally before *er,* at the end of words, as *finger.* *G* is mute before *n,* as *gnaſh, ſign.* *Gh* has the ſound of the hard *G* in the beginning of a word, as *ghoſtly;* in the middle, and ſometimes at the end, it is quite ſilent, as *right, though.* At the end of a word *Gh* has often the ſound of *f,* as *laugh, rough, tough.*

As a numeral, G was anciently uſed to denote 400; and with a daſh over it thus $\bar{G}$, 40,000.

As an abbreviature, G. ſtands for *Gaius, Gellius, gens, genius,* &c. G. G. for *gemina, geſſit, geſſerunt,* &c. G. C. for *genio civitatis* or *Cæſaris.* G. L. for *Gaius libertus,* or *genio loci.* G. V. S. for *genio urbis ſacrum.* G. B. for *genio bono.* And G. T. for *genio tutelari.*

In muſic, G is the character or mark of the treble cleff; and from its being placed at the head, or marking the firſt ſound in Guido's ſcale, the whole ſcale took the name of *gamut.*

GABALE, in mythology, a deity worſhipped at Heliopolis under the figure of a lion, with a radiant head; and it is thus repreſented on many medals of Caracalla.

GABARDINE, from the Italian *gavardina,* has been ſometimes uſed to denote a coarſe frock, or mean dreſs. In this ſenſe it is uſed by Shakeſpeare in his Tempeſt and Merchant of Venice, and by Butler in his Hudibras, book i.

GABARA, or GABBARA, in antiquity, the dead bodies which the Egyptians embalmed, and kept in their houſes, eſpecially thoſe of ſuch of their friends as died with the reputation of great piety and holineſs, or as martyrs. See EMBALMING, and MUMMY.

GABEL (*Gabella, Gablum, Gablagium*), in French *Gabelle,* i. e. *Vectigal,* hath the ſame ſignification among the ancient Engliſh writers that *gabelle* hath in France. It is a tax; but hath been variouſly uſed, as for a rent, cuſtom, ſervice, &c. And where it was a payment of rent, thoſe who paid it were termed *gablatores.* When the word *gabel* was formerly mentioned without any addition to it, it ſignified the tax on ſalt, though afterwards it was applied to all other taxes.

In the French cuſtoms, the gabelle, or tax on ſalt, computed to make one-fourth of the whole revenue of the kingdom, is ſaid to have had its riſe in France in 1286, under Philip the Fair. Philip the Long took a double per livre on ſalt, by an edict in 1318, which he promiſed to remit when he was delivered from his enemies; which was renewed by Philip de Valois in 1345; and the duty was raiſed to four deniers per livre; king John reſumed it in 1355, and it was granted to the dauphin in 1358, to ranſom king John. It was continued by Charles V. in 1366; after his deceaſe it was ſuppreſſed, but revived again by Cha. VI. in 1381. Louis XI. raiſed it to 12 deniers per livre; and Francis I. in 1542 to 24 livres per muid: and it has been conſiderably augmented ſince that time; ſo that a minot of ſalt latterly paid a duty of 52 livres, 8 ſols, and 6 deniers. Philip de Valois firſt eſtabliſhed granaries and officers of the gabelles, and prohibited any other perſons from ſelling ſalt: from which time the whole commerce of ſalt for the inland conſumption continued wholly in the king's hands, every grain thereof being ſold and diſtributed by his farmers and officers created for the purpoſe.—This very odious and oppreſſive tax has lately been aboliſhed by the National Aſſembly.

GABII, (anc. geog.), a town of Latium, midway almoſt between Rome and Preneſte to the eaſt, often mentioned in the hiſtory of Tarquin the Proud. *Cinctus Gabinus* denoted a particular way of tucking the gown, by drawing it forwards on the breaſt, and tying it into a knot; as the people of Gabii did at a ſolemn ſacrifice, on the ſudden attack of an enemy, in order to be fitter for action. In this manner the conſul uſed to declare war, to ſacrifice, and burn the ſpoils of the enemy; and then he was ſaid to be *præcinctus.* The place now extinct.

GABINIAN LAWS, in Roman antiquities; laws inſtituted upon ſeveral occaſions by perſons of the name of *Gabinius.* The firſt was the *Gabinian lex de Comitiis,* by A. Gabinius the tribune, in the year of Rome 614. It required that in the public aſſemblies for electing magiſtrates, the votes ſhould be given by tablets, and not *vivâ voce.*—Another *de Comitiis,* which made it a capital puniſhment to convene any clandeſtine aſſembly, agreeable to the old law of the 12 tables.—Another *de Militiâ,* by A. Gabinius the tribune, year of Rome 685. It granted Pompey the power of carrying on the war againſt the pirates during three years, and of obliging all kings, governors, and ſtates, to ſupply him with all the neceſſaries he wanted, over all the Mediterranean ſea, and in the maritime provinces as far as 400 *ſtadia* from the ſea.—Another *de Uſurâ* by Aul. Gabinius the tribune, year of Rome 685. It ordained that no action ſhould be granted for the recovery of any money borrowed upon ſmall intereſt to be lent upon larger. This was an uſual practice at Rome, which obtained the name of *verſuram facere.* Another againſt fornication.

GABIONS, in fortification, baſkets made of ozier-twigs, of a cylindrical form, ſix feet high and four wide; which, being filled with earth, ſerve as a ſhelter from the enemy's fire.

GABLE, or GABLE-*End,* of a houſe (from *gaval,* Welſh), is the upright triangular end from the cornice or eaves to the top of the houſe.

GABRES, or GAVRES, a religious ſect in Perſia and India; called alſo *Gebres, Guebres, Gevres, Gaurs,* &c. See MAGI.

The Turks call the Chriſtians *Gabres, q. d.* infidels, or people of a falſe religion; or rather, as Leunclavius obſerves, heathens or gentiles: the word *Gabre,* among the Turks, having the ſame ſignification as *pagan* or *infidel* among the Chriſtians, and denoting any thing not Mahometan.

In Perſia the word has a more peculiar ſignification; wherein it is applied to a ſect diſperſed through the country, and ſaid to be the remains of the ancient Perſians or followers of Zoroaſter, being worſhippers of fire. They have a ſuburb at Iſpahan, which is called *Gaurabad,* or "the town of the *Gaurs,*" where they are employed in the meaneſt and vileſt drudgery: ſome of them are diſperſed through other parts of Perſia; but they principally abound in Kerman, the moſt barren province in the whole country, where the Mahometans allow them liberty and the exerciſe of their religion. Several of them fled many ages ago into India, and ſettled about Surat, where their poſterity remain to this day. There is alſo a colony of them at Bombay. They are a poor, ignorant, inoffenſive people, extremely ſuperſtitious, and zealous for their rites, rigorous in their morals, and honeſt in their dealings. They profeſs to believe a reſurrection and a future judgment, and to worſhip only one God. And though they perform their worſhip before fire, and direct their devotion towards the riſing ſun, for which they have an extraordinary veneration, yet they ſtrenuouſly maintain that they worſhip neither; but that theſe are the moſt expreſſive ſymbols of the Deity, and that for this reaſon they turn towards them in their devotional ſervices.—However, ſome have ſuppoſed, that theſe are Perſians converted to Chriſtianity, who, being afterwards left to themſelves, mingled their ancient ſuperſtitions with the truths and practices of Chriſtianity, and ſo formed for themſelves a religion apart: and they allege, that throughout the whole of their ſyſtem of doctrine and practice, we may diſcern the marks and traces of Chriſtianity, though grievouſly defaced; the annunciation, the magi, the maſſacre of the infants, our Saviour's miracles, his perſecutions, aſcenſion, &c.

GABRIEL, the name of one of the principal angels in heaven. It ſignifies *the ſtrength of God.* There are a few events, in which this exalted being was concerned, recorded in ſcripture. He was ſent to the prophet Daniel, to explain to him the viſion of the ram and goat, and the myſtery of the ſeventy weeks, which had been revealed to him. He was ſent to Zacharias, to declare to him the future birth of John the Baptiſt. Six months after, he was ſent to Nazareth to the Virgin Mary, to warn her of the birth of Jeſus Chriſt.

The Orientaliſts add ſeveral particulars to what the ſcriptures inform us concerning the angel Gabriel. The Mahometans call him the *faithful ſpirit*; and the Perſians, by way of metaphor, the *peacock of heaven.* We read, in the ſecond chapter of the Koran, that *whoſoever is an enemy to Gabriel ſhall be confounded.* It was Gabriel, they believe, who brought to Mahomet their falſe prophet the revelations which he publiſhed; and it was he who conducted him to heaven mounted upon the animal Borak.

GABRIELITES, in eccleſiaſtical hiſtory, a ſect of anabaptiſts that appeared in Pomerania in 1530. They derive their name from Gabriel Scherling; who, after having been for ſome time tolerated in that country, was obliged to remove, and died in Poland.

GAD (anc. geog.), a diſtrict of the Transjordan Paleſtine, ſituated between Gilead and the kingdom of Baſhan to the north, and the kingdom of the Amorrites to the ſouth; having the Jordan to the weſt, and bounded by various people on the eaſt; ſo called from a tribe of that name.

GAD, among miners, a ſmall punch of iron, with a long wooden handle, uſed to break up the ore.

One of the miners holds this in his hand, directing the point to a proper place, while the other drives it into the vein, by ſtriking it with a ſledge-hammer.

Gad-Bee, or *Gad-Fly*. See OESTRUS.

GADARA (anc. geog.), a town of the Peræa, or Transjordan, in the Decapolis, a very ſtrong place. Reſtored by Pompey after its demolition by the Jews (Joſephus). After Herod's death it was joined to the province of Syria by Auguſtus.

GADARENORUM AGER (anc. geog.) the country of the Gadarenes, called by Matthew the country of the Gergeſens, becauſe it was a diſtrict that lay between Gadara and Gergeſa, otherwiſe called *Geraſa*, both which lay within the Decapolis on the other ſide Jordan.

GADES, or GADIRA (anc. geog.), a ſmall iſland in the Atlantic, on the Spaniſh coaſt, 25 miles from the Columns of Hercules. It was ſometimes called *Tarteſſus* and *Erythia* according to Pliny. Geryon, whom Hercules killed, fixed his reſidence there. Hercules, ſurnamed Gaditanus, had there a celebrated temple in which all his labours were engraved with excellent workmanſhip. The inhabitants are called Gaditani.

GADUS, in ichthyology, a genus of fiſhes belonging to the order of jugulares. The head is ſmooth; there are ſeven cylindrical rays in the branchioſtege membrane; the body is oblong, with deciduous ſcales; the whole fins are covered with the common ſkin of the fiſh; the rays of the back-fins are blunt, and thoſe of the breaſt are ſharp. There are 17 ſpecies, principally diſtinguiſhed by their cirri and the number of back-fins. The moſt remarkable are,

1. The *morhua*, or COMMON COD, is cinereous on the back and ſides, and commonly ſpotted with yellow: the belly is white; but they vary much, not only in colour, but in ſhape, particularly that of the head. The ſide-line is white, and broad, and ſtraight, till it reaches oppoſite the vent, when it bends towards the tail. Codlings are often taken of a yellow, orange, and even red colour, while they remain among the rocks; but on changing their place aſſume the colour of other cod-fiſh. The jaws are of an equal length, and at the end of the lower is a ſmall beard; the teeth are diſpoſed in the palate as well as in the jaws.

The cod is found only in the northern parts of the world; it is, as Rondeletius calls it, an ocean fiſh, and never met with in the Mediterranean Sea. It affects cold climates, and ſeems confined between the latitudes 66° and 50°; what are caught north and ſouth of thoſe degrees being either few in quantity or bad in quality. The Greenland fiſh are ſmall, and emaciated through want of food; being very voracious, and having in thoſe ſeas a ſcarcity of proviſion. This locality of ſituation is common to many other ſpecies of this genus, moſt of them being inhabitants of the cold ſeas, or ſuch as lie within regions that can juſt claim the title of *temperate.* There are nevertheleſs certain ſpecies found near the Canary Iſlands, called *cherny*, of which we know no more than the name; but which, according to Captain Glaſs, are better taſted than the Newfoundland kind.

The great rendezvous of the cod-fiſh is on the banks of Newfoundland, and the other ſand banks that lie off the coaſts of Cape Breton, Nova Scotia, and New England. They prefer thoſe ſituations, by reaſon of the quantity of worms produced in thoſe ſandy bottoms, which tempt them to reſort there for food; but another cauſe of the particular attachment the fiſh have to theſe ſpots, is their vicinity to the polar ſeas, where they return to ſpawn; there they depoſite their roes in full ſecurity; but want of food forces them, as ſoon as the firſt more ſouthern ſeas are open, to repair thither for ſubſiſtence. Few are taken north of Iceland, but on the ſouth and weſt coaſts they abound: they are again found to ſwarm on the coaſts of Norway, in the Baltic, off the Orkney and the Weſtern Iſles; after which their numbers decreaſe, in proportion as they advice towards the ſouth, when they ſeem quite to ceaſe before they reach the mouth of the Straits of Gibraltar.

Before the diſcovery of Newfoundland, the greater fiſheries of cod were on the ſeas of Iceland, and off the Weſtern Iſles, which were the grand reſort of ſhips from all the commercial nations; but it ſeems that the greateſt plenty was met with near Iceland. The Engliſh reſorted thither before the year 1415: for we find that Henry V. was diſpoſed to give the king of Denmark ſatisfaction for certain irregularities committed on thoſe ſeas by his ſubjects. In the reign of Edward IV. the Engliſh were excluded from the fiſhery by treaty; and forbidden to reſort there under pain of forfeiture of life and goods. Notwithſtanding this, that monarch afterwards gave licence to a ſhip of Hull to ſail to Iceland, and there relade fiſh and other goods, without regard to any reſtrictions to the contrary. The right of the Engliſh in latter times was far from being confirmed: for we find Queen Elizabeth condeſcending to aſk permiſſion to fiſh in thoſe ſeas from Chriſtian IV. of Denmark; yet afterwards ſhe ſo far repented her requeſt, as to inſtruct her ambaſſadors at that court to inſiſt on the right of a free and univerſal fiſhery. In the reign of her ſucceſſor, however, they had not fewer than 150 ſhips employed in the Iceland fiſhery; which indulgence might ariſe from the marriage of James with a princeſs of Denmark. But the Spaniſh, the French, and the Bretons, had much the advantage of the Engliſh in all fiſheries at the beginning, as appears by the ſtate of that in the ſeas of Newfoundland in the year 1578, when the number of ſhips belonging to each nation ſtood thus:

Spaniards, 100, beſides 20 or 30 that came from Biſcay to take whale for train, being about five or ſix thouſand tons.
Portugueſe 50, or three thouſand tons.
French and Bretons 150, or ſeven thouſand tons.
Engliſh, from 30 to 50.

The increaſe of ſhipping that reſort to thoſe fertile banks is now unſpeakable. Britain now enjoys the greateſt ſhare; which ought to be eſteemed their chiefeſt treaſure, as it brings wealth to individuals, and ſtrength to the ſtate. See Fishery.

All this immenſe fiſhery is carried on by the hook and line only. We have been informed that they fiſh from the depth of 16 to 60 fathoms, according to the inequality of the bank, which is repreſented as a vaſt mountain, under water, above 500 miles long, and near 300 broad; and that ſeamen know when they approach it by the great ſwell of the ſeas and the thick miſts that impend over it. The bait is herring, a ſmall fiſh called a *capelin*, a ſhell-fiſh called *clams*, and bits of ſea-fowl; and with theſe are caught fiſh ſufficient to find employ for near 15,000 Britiſh ſeamen, and to afford ſubſiſtence to a much more numerous body of people at home, who are engaged in the various manufactures which ſo vaſt a fiſhery demands.

The food of the cod is either ſmall fiſh, worms, teſtaceous or cruſtaceous animals, ſuch as crabs, large whelks, &c.; and their digeſtion is ſo powerful as to diſſolve the greateſt part of the ſhells they ſwallow. They are very voracious, and catch at any ſmall body they perceive moved by the water, even ſtones and pebbles, which are often found in their ſtomachs.

Fiſhermen are well acquainted with the uſe of the air-bladder or ſound of the cod; and are very dextrous in perforating this part of a live fiſh with a needle, in order to diſengage the incloſed air; for without this operation it could not be kept under water in the well-boats, and brought freſh to market. The ſounds of the cod ſalted is a delicacy often brought from Newfoundland. Iſinglaſs is alſo made of this part by the Iceland fiſhermen: a proceſs which deſerves the attention of the natives of the north of Scotland, where theſe fiſh are plentiful. It is given under the article Ichthyocolla.

Providence hath kindly ordained, that this fiſh, ſo uſeful to mankind, ſhould be ſo very prolific as to ſupply more than the deficiences of the multitudes annually taken. Leuwenhoeck counted 9,384,000 eggs in a cod-fiſh of a middling ſize, a number, ſure, that will baffle all the efforts of man, or the voracity of the inhabitants of the ocean, to exterminate, and which will ſecure to all ages an inexhauſtible ſupply of grateful proviſion.

In the Britiſh ſeas they begin to ſpawn in January, and depoſite their eggs in rough ground among rocks. Some continue in roe till the beginning of April. The codfiſh in general recover quicker after ſpawning than any other fiſh; therefore it is common to take ſome good ones all the ſummer. When they are out of ſeaſon, they are thin-tailed and louſy; and the lice chiefly fix themſelves on the inſide of their mouths.

The fiſh of a middling ſize are moſt eſteemed for the table; and are choſen by their plumpneſs and roundneſs, eſpecially near the tail, by the depth of the ſulcus or pit behind the head, and by the regular undulated appearance of the ſides, as if they were ribbed. The glutinous parts about the head loſe their delicate flavour after it has been 24 hours out of the water, even in winter, when theſe and other fiſh of this genus are in higheſt ſeaſon.

One mentioned by Mr Pennant as the largeſt that he ever heard of taken on the Britiſh coaſts, weighed 78 pounds: the length was five feet eight inches, and the girth round the ſhoulders five feet. It was taken at Scarborough in 1755, and was ſold for one ſhilling. But the general weight of theſe fiſh in the Yorkſhire ſeas, he ſays, is from 14 to 40 pounds. This ſpecies is ſhort in proportion to its bulk, the belly being very large and prominent.

2. The *egleſinus*, or Haddock, has a long body; the upper part of a duſky brown colour, and the belly and lower part of the ſides ſilvery: On the back are three fins reſembling thoſe of the common cod-fiſh; the lateral line is black; and the tail is forked: The head ſlopes down to the noſe; on the chin is a ſhort beard; and on each ſide beyond the gills is a large black ſpot. Superſtition aſſigns this mark to the im-

preſſion St Peter left with his finger and thumb when he took the tribute out of the mouth of a fiſh of this ſpecies, which has been continued to the whole race of haddocks ever ſince that miracle. Large haddocks begin to be in roe in the middle of November, and continue ſo to the end of January; from that time till May they are very thin-tailed, and much out of ſeaſon. In May they begin to recover; and ſome of the middling-ſized fiſh are then very good, and continue improving till the time of their greateſt perfection. The ſmall ones are extremely good from May till February, and ſome even in February, March, and April, *viz.* thoſe which are not old enough to breed.

The fiſhermen aſſert that in rough weather haddocks ſink down into the ſand and ooze in the bottom of the ſea, and ſhelter themſelves there till the ſtorm is over; becauſe in ſtormy weather they take none, and thoſe that are taken immediately after a ſtorm are covered with mud on their backs.

In ſummer they live on young herrings and other ſmall fiſh; in winter on the ſtone coated worms *, which the fiſhermen call *haddock-meat*.

The grand ſhoal of haddocks comes periodically on the Yorkſhire coaſts. It is remarkable that they appeared in 1766 on the 10th of December, and exactly on the ſame day in 1767: theſe ſhoals extended from the ſhore near three miles in breadth, and in length from Flamborough head to Tinmouth-caſtle, and perhaps much farther northwards. An idea may be given of their numbers by the following fact: Three fiſhermen, within the diſtance of a mile from Scarborough harbour, frequently loaded their coble or boat with them twice a-day, taking each time about a ton of fiſh: when they put down their lines beyond the diſtance of three miles from the ſhore, they caught nothing but dog-fiſh, which ſhows how exactly theſe fiſh keep their limits. The beſt haddocks were ſold from eightpence to a ſhilling *per* ſcore; and the poor had the ſmaller ſort at a penny and ſometimes a halfpenny *per* ſcore.

The large haddocks quit the coaſt as ſoon as they go out of ſeaſon, and leave behind great plenty of ſmall ones. It is ſaid that the large ones viſit the coaſts of Hamburgh and Jutland in the ſummer. It is no leſs remarkable than providential, that all kinds of fiſh (except makrel) which frequent the Yorkſhire coaſt, approach the ſhore, and as it were offer themſelves to the inhabitants generally remaining there as long as they are in high ſeaſon, and retire when they become unfit for uſe. It is the commoneſt ſpecies in the London markets. They do not grow to a great bulk, one of 14 pounds being of an uncommon ſize, but thoſe are extremely courſe: the beſt for the table weighing from two to three pounds.

3. The *barbatus*, or POUT, never grows to a large ſize, ſeldom exceeding a foot in length. It is diſtinguiſhed from all others by its great depth; and of the ſize abovementioned being near four inches deep in the broadeſt part. The back is very much arched, and carinated: the colour of the fins and tail are black: at the bottom of the pectoral fins is a black ſpot. The lateral line is white, broad, and crooked. The tail is even at the end, and of a duſky colour. The colour of the body is white; but more obſcure on the back than the belly, and tinged with yellow.—It is called at Scarborough a *kleg*, and is a very delicate fiſh.

4. The *Minutus*, or POOR, is the ſmalleſt ſpecies yet diſcovered, being little more than ſix inches long. On the chin is a ſmall beard; the eyes are covered with a looſe membrane: on the gill-covers and the jaws there are on each ſide nine punctures. The colour on the back is a light brown; on the belly a dirty white. It is taken near Marſeilles, and ſometimes in ſuch quantities as to become a nuiſance, for no other kinds of fiſh are taken during their ſeaſon. It is eſteemed good, but incapable of being ſalted or dried. Belon ſays, that when it is dried in the ſun it grows as hard as horn. We owe the diſcovery of this kind in our ſeas to the Reverend Mr Jago.

5. The *carbonarius*, or COAL-FISH, is of a more elegant form than the cod-fiſh: they generally grow to the length of two feet and an half, and weigh about 28 or 30 pounds at moſt. The head is ſmall; the under jaw a little longer than the upper; The tail is broad and forked. They vary in colour: ſome have their back, noſe, dorſal fins, and tail of a deep black; the gill-covers, ſilver and black; the ventral and anal fins and the belly, white: Others are duſky, others brown; but, in all, the lateral line is ſtraight and white, and the lower part of the ventral and anal fins white. This fiſh takes its name from the black colour that it ſometimes aſſumes. Belon calls it the *colfiſch*, imagining that it was ſo named by the Engliſh, from its producing the Ichthyocolla; but Geſner gives the true etymology. Theſe fiſh are common on moſt of the rocky and deep coaſts, but particularly thoſe of the north of Great Britain. They ſwarm about the Orkneys, where the fry are the great ſupport of the poor. The young begin to appear on the Yorkſhire coaſt the beginning of July in vaſt ſhoals, and are at that time about an inch and an half long. In Auguſt they are from three to five inches in length, and are taken in great numbers with the angling rod: they are then eſteemed a very delicate fiſh; but grow ſo coarſe when they are a year old, that few people will eat them. Fiſh of that age are from 8 to 15 inches long, and begin to have a little blackneſs near the gills and on the back, and the blackneſs increaſes as they grow older.

The fry is known by different names in different places: they are called at Scarborough *parrs*; and when a year old, *billets*. About 20 years age ſuch a glut of parrs viſited that part, that for ſeveral weeks it was impoſſible to dip a pail into the ſea without taking ſome.

Though this fiſh is ſo little eſteemed when freſh, yet it is ſalted and dried for ſale.

6. The *pollachius*, or POULLACK, has the under jaw longer than the upper; the head and body riſes pretty high, as far as the firſt dorſal fin. The ſide line is incurvated, riſing towards the middle of the back, then ſinking and running ſtraight to the tail; it is broad, and of a brown colour. The colour of the back is duſky, ſometimes inclining to green: the ſides beneath the lateral line are marked with lines of yellow; and the belly is white.—This fiſh is common on many of our rocky coaſts: during ſummer they are ſeen in great ſhoals frolicking on the ſurface of the water, and flinging themſelves into a thouſand forms. They are at that time ſo wanton as to bite at any thing that appears on the top of the waves, and are often taken

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* A ſpecies of *Serpulæ*.

with a gooſe-feather fixed to the hook. They are very ſtrong, being obſerved to keep their ſtations at the feet of the rocks in the moſt turbulent and rapid ſea. They are a good eating fiſh. They do not grow to a very large ſize; at leaſt the biggeſt ſeldom exceed ſix or ſeven pounds; but ſome have been taken in the ſea near Scarborough, which they frequent during winter, that weighed near 28 pounds. They are there called *leets*.

7. The *merlangus*, or WHITING is a fiſh of an elegant make: the upper jaw is the longeſt; the eyes are large, the noſe is ſharp; the teeth of the upper jaw are long, and appear above the lower when cloſed. The colour of the head and back is pale brown: the lateral line white, and crooked; the belly and ſides are ſilvery, the laſt ſtreaked lengthwiſe with yellow.

Theſe fiſh appear in vaſt ſhoals in the Britiſh ſeas in the ſpring, keeping at the diſtance of about half a mile to that of three from the ſhore. They are caught in vaſt numbers by the line, and afford excellent diverſion. They are the moſt delicate, as well as the moſt wholeſome, of any of the genus; but they do not grow to a large ſize, the biggeſt not exceeding 20 inches; and even that is very uncommon, the uſual length being 10 or 12; though, it is ſaid, that whitings from 4 to 8 pounds in weight have been taken in the deep water at the edge of the Dogger-Bank.

8. The *merlucius*, or HAKE, is found in vaſt abundance on the Britiſh coaſts, and of thoſe of Ireland. There was formerly a vaſt ſtationary fiſhery of hake on the Nymph Bank off the coaſt of Waterford, immenſe quantities appearing there twice a-year; the firſt ſhoal coming in June, during the mackrel-ſeaſon; the other in September, at the beginning of the herring ſeaſon, probably in purſuit of thoſe fiſh: it was no unuſual thing for ſix men with hooks and lines to take a thouſand hake in one night, beſides a conſiderable quantity of other fiſh. Theſe were ſalted and ſent to Spain, particularly to Bilboa. We are at this time uninformed of the ſtate of this fiſhery; but find that Mr Smith, who wrote the hiſtory of the county of Waterford, complains even in his time (1746) of its decline. Many of the gregarious fiſh are ſubject to change their ſituations, and deſert their haunts for numbers of years, and then return again. Mr Smith inſtances the loſs of the haddock on the Waterford ſhores, where they uſed to ſwarm; and we can bring the capriciouſneſs of the herrings which ſo frequently quit their ſtations, as another example.—Sometimes the irregular migration of fiſh is owing to their being followed and harraſſed by an unuſual number of fiſh of prey, ſuch as the ſhark kind; ſometimes to a deficiency of the ſmaller fiſh, which ſerved them as food; and laſtly, in many places to the cuſtom of trawling, which not only demoliſhes a quantity of their ſpawn, which is depoſited in the ſand, but alſo deſtroys or drives into deeper waters numberleſs worms and inſects, the repaſt of many fiſh.—The hake is in England eſteemed a very coarſe fiſh, and is ſeldom admitted to table either freſh or ſalted. When cured it is known by the name of *Poor John*. Theſe fiſh are from a foot and an half to near twice that length; they are of a ſlender make, of a pale aſh-colour on their backs, and of a dirty white on their bellies.

10. The *molva*, or LING, is uſually from three to four feet long, but have been heard of ſeven feet long. The body is very ſlender; the head flat: the upper jaw is the longeſt; the teeth in that jaw are ſmall and very numerous; in the lower, few, ſlender, and ſharp; on the chin is a ſmall beard. They vary in colour, ſome being of an olive hue on the ſides and back, others cinereous; the belly white. The ventral fins are white: the dorſal and anal edged with white. The tail is marked near the end with a tranſverſe black bar, and tipt with white. The ling takes its Engliſh name from its length, being corrupted from the word *long*. It abounds about the Scilly Iſles, on the coaſt of Scarborough, and thoſe of Scotland and Ireland, and forms a conſiderable article of commerce. This branch of trade was conſiderable ſo long ago as the reign of Edward III. an act for regulating the price of lob, *ling*, and cod, being made in his 31ſt year. In the Yorkſhire ſeas they are in perfection from the beginning of February to the beginning of May, and ſome till the end of that month. In June they ſpawn, depoſiting their eggs in the ſoft oozy ground of the mouth of the Tees: at that time the males ſeparate from the females, and reſort to ſome rocky ground near Flamborough-head, where the fiſhermen take great numbers without ever finding any of the female or roe'd fiſh among them. While a ling is in ſeaſon its liver is very white, and abounds with a fine-flavoured oil; but as ſoon as the fiſh goes out of ſeaſon, the liver becomes red as that of a bullock, and affords no oil. The ſame happens to the cod and other fiſh in a certain degree, but not ſo remarkably as in the ling. When the fiſh is in perfection, a very large quantity of oil may be melted out of the liver by a ſlow fire; but if a violent ſudden heat be uſed for that purpoſe, they yield very little. The oil, which nature hoards up in the cellular membranes of the fiſhes, returns into their blood, and ſupports them in the engendering ſeaſon, when they purſue the buſineſs of generation with ſo much eagerneſs as to neglect their food. Vaſt quantities of ling are ſalted for exportation as well as for home-conſumption. When it is cut or ſplit for curing, it muſt meaſure 26 inches or upwards from the ſhoulder to the tail: if leſs than that, it is not reckoned a ſizeable fiſh, and conſequently not intitled to the bounty on exportation; ſuch are called *drizzles*, and are in ſeaſon all ſummer.

11. The *lota*, or BURBOT, in its body has ſome reſemblance to that of an eel, only ſhorter and thicker; and its motions alſo reſemble thoſe of that fiſh; they are beſides very ſmooth, ſlippery, and ſlimy. The head is very ugly, being flat and ſhaped like that of a toad: the teeth are very ſmall, but numerous. On the end of the noſe are two ſmall beards; on the chin another. The colour varies: ſome are duſky, others are of a dirty green, ſpotted with black, and oftentimes with yellow; and the belly in ſome is white; but the real colours are frequently concealed by the ſlime. This fiſh abounds in the lake of Geneva, where it is called *lota*; and it is alſo met with in the Lago Magiore and Lugano. In Britain it is found in the Trent; but in greater plenty in the river Witham, and in the great eaſt fen in Lincolnſhire. It is a very delicate fiſh for the table, though of a diſguſting appearance when alive. It is very voracious, and preys on the fry and leſſer fiſh. It does not often take a bait, but is generally

rally caught in weels. The largeſt taken in Britain weigh between two and three pounds, but in other parts are ſometimes found of double that weight.

12. The *muſtela*, or FIVE BEARDED COD, very much reſembles the former. The beards on the upper jaw are four, viz. at the very end of the noſe, and two a little above them: on the end of the lower jaw a ſingle one. The fiſh are of a deep olive brown, their belly whitiſh. They grow to the ſame ſize as the former.---The Corniſh fiſhermen are ſaid to whiſtle, and make uſe of the words *bod, bod, vean,* when they are deſirous of taking this fiſh, as if by that they facilitated the capture. In the ſame manner the Sicilian fiſhermen repeat their *mamaſſu di pajanu,* &c. when they are in purſuit of the ſword-fiſh.

13. The TORSK, or, as it is called in the Shetlands, *tuſk* and *briſmack,* is a northern fiſh; and as yet undiſcovered lower than about the Orkneys, and even there it is rather ſcarce. In the ſeas about Shetland, it ſwarms, and forms (barrelled or dried) a conſiderable article of commerce. The length is about 20 inches, the greateſt depth four and a half. The head is ſmall; the upper jaw a little longer than the lower; both jaws furniſhed with multitudes of ſmall teeth: on the chin is a ſmall ſingle beard: from the head to the dorſal fin is a deep furrow. The colour of the head is duſky: the back and ſides yellow; belly white; edges of the dorſal, anal, and caudal fins, white; the other parts duſky; the pectoral-fins, brown.

GAELIC LANGUAGE. See HIGHLANDS.

GÆTULIA, (anc. geog.), a country of Africa, lying to the ſouth of Mauritania, called *Gætulia Propria*, and *Vetus*. *Gætuli*, the people, were diſtinguiſhed by different epithets; as *Nigri*, *Autololes*, *Daræ*, and *Baniuræ*, (Pliny). The *Gætuli* were among the firſt inhabitants of Africa; a rough, unpoliſhed people, living on veniſon and the ſpontaneous productions of the earth; a roving wandering people, who took up with the firſt place in which night ſurpriſed them, (Salluſt.)

GAFF, a ſort of boom or pole, frequently uſed in ſmall ſhips, to extend the upper edge of the mizen; and always employed for the ſame purpoſe on thoſe ſails whoſe foremoſt edges are joined to the maſt by hoops or lacings, and which are uſually extended by a boom below. Such are the main-ſails of all ſloops, brigs, and ſchooners.

GAFFAREL (James), a French divine, and very learned writer, born about 1601. He acquired great ſkill in the oriental and ſeveral other languages; and was particularly verſant in the cabbaliſtic and occult ſciences, which he learned, expoſed, and refuted. Cardinal Richelieu made choice of him for his library-keeper, and ſent him into Italy to collect the beſt manuſcripts and books. He publiſhed a book, intitled *Curioſitez Innouies*. i. e. Unheard of Curioſities. It is ſaid the cardinal deſigned to emply him in his grand project for the re-union of religions. He died in 1681, aged 80. He had been labouring for many years, and had almoſt finiſhed a hiſtory of the ſubterranean world; containing on account of the caves, grottoes, vaults, catacombs, and mines, he had met with in 30 years travels.

GAGATES, or JET. See JET.

GAGE, in ancient cuſtoms, ſignifies a pledge or pawn, given by way of ſecurity. The word is only properly uſed in ſpeaking of moveables; for immoveables, *hypotheca* is uſed.

If the gage periſh, the perſon who received it is not to anſwer for it, but only for extreme negligence, &c.

GAGE is alſo uſed for a challenge to combat: See CARTEL. In which ſenſe, it was a pledge, which the accuſer or challenger caſt on the ground, and the other took up as accepting the challenge: it was uſually a glove, gauntlet, chaperoon, or the like. See COMBAT, and DUEL.

GAGE is only now retained as a ſubſtantive. As a verb, the *G* is changed into *W*, and of *gage* is formed *wage*: as, to wage law, to wage deliverance, *q. d.* to give ſecurity a thing ſhall be delivered. See WAGE.

If a perſon who has diſtrained be ſued for not having delivered what he had taken by diſtreſs, he ſhould wage, or gage, or gager, deliverance; that is, put in ſurety that he will deliver them.

Mort-GAGE, is that which is left in the hands of the proprietor, ſo that he reaps the fruits thereof.

In oppoſition to *vif-gage*, where the fruits or revenues are reaped by the creditor, and reckoned on the foot of the debt, which diminiſhes in proportion thereto. The ſecond acquits or diſcharges itſelf; the firſt does not.

GAGE, in the ſea-language. When one ſhip is to windward of another, ſhe is ſaid to have the weather-gage of her. They likewiſe call the number of feet that a veſſel ſinks in the water, the ſhip's *gage*; this they find by driving a nail into a pike near the end, and putting it down beſide the rudder till the nail catch hold under it; then as many feet as the pike is under water is the ſhip's gage.

GAGE, among letter-founders, a piece of box, or other hard wood, variouſly notched; the uſe of which is to adjuſt the dimenſions, ſlopes, &c. of the different ſorts of letters. See FOUNDERY.

GAGE, in joinery, is an inſtrument made to ſtrike a line truly parallel to the ſtrait ſide of any board or piece of ſtuff. Its chief uſe is for gaging of tenons true, to fit into mortoiſes; and for gaging ſtuff of an equal thickneſs. It is made of an oval piece of wood, fitted upon a ſquare ſtick, to ſlide up and down ſtiffly thereon; and with a tooth at the end of a ſtaff, to ſcore, to ſtrike a line upon the ſtuff at any diſtance, according to the diſtance of the oval from it.

Sliding GAGE, a tool uſed by mathematical inſtrument-makers for meaſuring and ſetting off diſtances.

Sea-GAGE, an inſtrument invented by Dr Hales and Dr Deſaguliers for finding the depth of the ſea; the deſcription whereof is this, AB (Plate CCV. fig. 1. n° 1.) is the gage-bottle, in which is cemented the gage-tube *Ff* in the braſs cape at G. The upper end of tube F is hermetically ſealed, and the open lower end *f* is immerſed in mercury, marked C, on which ſwims a ſmall thickneſs or ſurface of treacle. On the top of the bottle is ſcrewed a tube of braſs HG, pierced with ſeveral holes to admit the water into the bottle AB. The body K is a weight hanging by its ſhank L, in a ſocket N, with a notch on one ſide at *m*, in which is fixed the catch *l* of the ſpring S, and paſſing through the hole L, in the ſhank of the weight K, prevents its falling out when once hung on. On the top, in the upper part of the braſs tube at H, is fixed a large empty ball, or full blown bladder I, which muſt not be ſo large, but that the weight K may be able to ſink the whole under water.

The inſtrument thus conſtructed is uſed in the following manner. The weight K being hung on, the gage is let fall into deep water, and ſinks to the bottom; the ſocket N is ſomewhat longer than the ſhank L; and therefore, after the weight K comes to the bottom, the gage will continue to deſcend till the lower part of the ſocket ſtrikes againſt the weight: this gives liberty to the catch to fly out of the hole L, and let go the weight K: when this is done, the ball or bladder I inſtantly buoys up the gage to the top of the water. While the gage is under water, the water having free acceſs to the treacle and mercury in the bottle, will by its preſſure force it up into the tube F *f*, and the height to which it had been forced by the greateſt preſſure, viz. that at the bottom, will be ſhown by the mark in the tube which the treacle leaves behind it, and which is the only uſe of the treacle. This ſhows into what ſpace the whole air in the tube F*f* is compreſſed; and conſequently the height or depth of the water which by its weight produced that compreſſion, which is the thing required.

If the gage-tube F*f* be of glaſs, a ſcale might be drawn on it with the point of a diamond, ſhowing, by inſpection, what height the water ſtands above the bottom. But the length of 10 inches is not ſufficient for fathoming depths at ſea, ſince that, when all the air in ſuch a length of tube is compreſſed into half an inch, the depth of water is no more than 634 feet, which is not half a quarter of a mile.

If to remedy this we make uſe of a tube 50 inches long, which for ſtrength may be a muſket-barrel, and ſuppoſe the air compreſſed into an hundredth part of half an inch; then by ſaying, as 1 : 99 : : 400 : 35600 inches, or 3300 feet; even this is but little more than half a mile, or 2640 feet. But ſince it is reaſonable to ſuppoſe the cavities of the ſea bear ſome proportion to the mountainous parts of the land, ſome of which are more than three miles above the earth's ſurface; therefore to explore ſuch great depths, the doctor contrived a new form for his ſea-gage, or rather for the gage-tube in it, as follows. BCDF (*ibid.* n° 2.) is a hollow metalline globe communicating on the top with a long tube AB, whoſe capacity is a ninth part of that globe. On the lower part at D, it has alſo a ſhort tube DE, to ſtand in the mercury and treacle. The air contained in the compound gage-tube is compreſſed by the water as before; but the degree of compreſſion, or height to which the treacle has been forced, cannot there be ſeen through the tube; therefore, to anſwer that end, a ſlender rod of metal or wood, with a knob on the top of the tube AB, will receive the mark of the treacle, and ſhow it when taken out.

If the tube AB be 50 inches long, and of ſuch a bore that every inch in length ſhould be a cubic inch of air, and the contents of the globe and tube together 500 cubic inches; then, when the air is compreſſed within an hundredth part of the whole, it is evident the treacle will not approach nearer than five inches of the top of the tube, which will agree to the depth of 3300 feet of water as above. Twice this depth will compreſs the air into half that ſpace nearly, viz. $2\frac{1}{2}$ inches, which correſpond to 6600, which is a mile and a quarter. Again, half that ſpace, or $1\frac{1}{4}$ inch, will ſhow double the former depth, viz. 1300 feet, or $2\frac{1}{2}$ miles; which is probably very nearly the greateſt depth of the ſea.

*Bucket Sea-*G*AGE*; an inſtrument contrived by Dr Hales, to find the different degrees of coolneſs and ſaltneſs of the ſea, at different depths; it conſiſts of a common houſehold pail or bucket, with two heads. Fig. 2. Theſe heads have each a round hole in the middle, about four inches in diameter, covered with ſquare valves opening upward; and that they may both open and ſhut together, there is a ſmall iron rod fixed to the upper part of the lower valve, and the other end to the lower ſide of the upper valve. So that as the bucket deſcends with its ſinking weight into the ſea, both the valves may open by the force of the water, which by that means has a free paſſage through the bucket. But when the bucket is drawn up, then both the valves ſhut by the force of the water at the upper part of the bucket; ſo that the bucket is drawn up full of the loweſt ſea water to which it has deſcended. When the bucket is drawn up, the mercurial thermometer fixed in it is examined; but great care muſt be taken to obſerve the degree at which the mercury ſtands, before the lower part of the thermometer is taken out of the water in the bucket, leſt it be affected by the different temperature of the air. In order to keep the bucket in a right poſition, there are four cords fixed to it, reaching about three feet below it; to which the ſinking weight is fixed. The reſult of ſeveral trials with this gage was, that when it was let down to different depths, from 360 feet to 5346 feet, in lat. 25. 13. N. and long. 25. 12. W. it was diſcovered by the thermometer, that the cold increaſed gradually in proportion to the depths, till it deſcended to 3900 feet, *viz.* near $\frac{3}{4}$ths of a mile, whence the mercury in the thermometer came up at 53°; and though it was afterwards ſunk to 5346 feet, *i. e.* a mile and 66 feet, it came up no lower: the warmth of the water upon the ſurface, and that of the air, was all that time 84°. When the water in the bucket was become of the ſame temperature with that on the ſurface of the ſea, equal quantities of both were weighed and tried by the hydrometer; that from below was found to be the heavieſt, and conſequently the ſalteſt.

Dr Hales was probably led to the conſtruction of this ſea-gage from an inſtrument invented by Dr Hook, and deſigned for the ſame purpoſe. This conſiſts of a ſquare wooden bucket C, whoſe bottoms are ſo contrived, that as the weight A ſinks the iron B, to which the bucket C is faſtened by two handles D, D, on the end of which are the moveable bottoms or valves E E, and thereby draws down the bucket, the reſiſtance of the water keeps up the bucket in the poſture C, whereby the water, whilſt the bucket is deſcending, hath a free paſſage through it; whereas, as ſoon as the bucket is pulled upwards by the line F, the reſiſtance of the water to that motion beats the bucket downwards, and keeps it in the poſture G, whereby the included water is kept from getting out, and the ambient water kept from getting in. Phil. Tranſ. N° 9. p. 149. and N° 24. p. 447. or abr. vol. ii. p. 260.

Aqueo-mercurial GAGE, is the name of an apparatus contrived by Dr Hales, and applied in various forms to the branches of trees, in order to determine the force with which they imbibe moiſture. Let *e r*,
Fig. 3. be a cylindric glaſs, e. gr. of an inch diameter within, and eight inches long. Into this glaſs is introduced the branch of a young thriving apple-tree *b*, about three feet long, with lateral branches; the diameter of the tranſverſe cut *i* being $\frac{3}{4}$ of an inch. Having fitted the joint *r* to the tube at *r*, by folding a piece of ſheep's ſkin round the ſtem, it is cemented with a mixture of bees-wax and turpentine melted together, in ſuch a proportion as to make a very ſtiff clammy paſte when cold, and over the cement folds of wet bladders are bound firmly with packthread. To the lower end *e* of the large tube, a ſmaller tube *z e* is cemented, being about $\frac{1}{4}$ of an inch diameter, and 18 inches long, and in ſubſtance full $\frac{1}{8}$ of an inch thick. Theſe tubes are cemented together at *e* with common hard brick-duſt or powdered chalk cement, and the joint is farther ſecured with the cement of bees-wax and turpentine, over which a wet bladder is bound. The apparatus being thus prepared, the branch is turned downwards, and the glaſs tube upwards, and then both tubes are filled with water; with the finger applied to the open end of the ſmall tube, it is inverted and immerſed in the glaſs ciſtern *x*, full of mercury and water. In this ſituation the lower end of the branch was immerſed ſix inches in water, viz. from *r* to *i*; the water was imbibed by the branch at its tranſverſe cut *i*; and during its aſcent into the ſap-veſſels of the branch, the mercury roſe in the tube *e z* from the ciſtern *x*, ſo that in half an hour it was riſen $5\frac{3}{4}$ inches high, as far as *z*. The height of the mercury indicated, in ſome meaſure, the force with which the ſap was imbibed, though not the whole force; becauſe, while the water was imbibed by the branch, its tranſverſe cut was covered with innumerable little hemiſpheres of air, and many air-bubbles iſſued out of the ſap-veſſels, which partly filled the tube *e r*, as the water was drawn out of it: and therefore, the height of the mercury could only be proportionable to the exceſs of the quantity of water drawn off above the quantity of the air which iſſued out of the wood. If the quantity of air iſſuing from the wood had been equal to the quantity of water imbibed, it is plain that the mercury could not riſe at all, becauſe there would be no room for it in the tube: but if nine parts in twelve of the water be imbibed by the branch, and only three ſuch parts of air iſſue into the tube in the ſame time, the mercury muſt riſe near ſix inches, and ſo proportionably in other caſes. Dr Hales obſerved, that the mercury roſe higheſt, in moſt caſes, when the ſun was clear and warm, and that it ſubſided three or four inches towards evening, but roſe again the next day as it grew warm, though ſeldom ſo high as at firſt. Dr Hales adapted the ſize and ſhape of the glaſs apparatus to a great variety of branches of ſeveral ſizes and of different kinds of trees, and repeated the experiment above deſcribed, *mutatis mutandis*, in a variety of inſtances. See his Vegetable Statics, vol. i. chap. ii. p. 84, &c.

Tide-GAGE, is the name of an inſtrument uſed for determining the height of the tides by Mr Bayly, in the courſe of a voyage towards the ſouth-pole, &c. in the Reſolution and Adventure, in 1772, 1773, 1774, and 1775. This inſtrument conſiſts of a glaſs tube, whoſe internal diameter was ſeven-tenths of an inch, laſhed faſt to a ten feet fir rod; divided into feet, inches, and quarters: this rod was faſtened to a ſtrong poſt fixed upright and firm in the water. At the lower end of the tube was an exceeding ſmall aperture, through which the water was admitted. In conſequence of this conſtruction, the ſurface of the water in the tube was ſo little affected by the agitation of the ſea, that its height was not altered one-tenth of an inch; when the ſwell of the ſea was two feet; and Mr Bayly was certain, that with this inſtrument he could diſcern a difference of one-tenth of an inch in the height of the tide.

Wind-GAGE, an inſtrument for meaſuring the force of the wind upon any given ſurface. It was invented by Dr Lind, who gives the following deſcription of it, Phil. Tranſ. Vol. LXV.

This inſtrument conſiſts of two glaſs tubes AB, CD, of five or ſix inches in length. Their bores, which are ſo much the better for being equal, are about four-tenths of an inch in diameter. They are connected Fig. 4. together like a ſiphon, by a ſmall bent glaſs-tube *a b*, the bore of which is about one-tenth of an inch in diameter. On the upper end of the leg AB there is a tube of latten braſs, which is kneed or bent perpendicularly outwards, and has its mouth open towards F. On the other leg CD, is a cover with a round hole G in the upper part of it, two-tenths of an inch in diameter. This cover and the kneed tube are connected together by a ſlip of braſs *ed*, which not only gives ſtrength to the whole inſtrument, but alſo ſerves to hold the ſcale HI. The kneed tube and cover, are fixed on with hard cement or ſealing wax. To the ſame tube is ſoldered a piece of braſs *e*, with a round hole in it to receive the ſteel ſpindle KL; and at *f* there is juſt ſuch another piece of braſs ſoldered to the braſs-hoop *gh*, which ſurrounds both legs of the inſtrument. There is a ſmall ſhoulder on the ſpindle at *f*, upon which the inſtrument reſts, and a ſmall nut at *i*, to prevent it from being blown off the ſpindle by the wind. The whole inſtrument is eaſily turned round upon the ſpindle by the wind, ſo as always to preſent the mouth of the kneed tube towards it. The end of the ſpindle has a ſcrew on it; by which it may be ſcrewed into the top of a poſt or a ſtand made on purpoſe. It has alſo a hole at L, to admit a ſmall lever for ſcrewing it into wood with more readineſs and facility. A thin plate of braſs *k* is ſoldered to the kneed tube, about half an inch above the round hole G, ſo as to prevent rain from falling into it. There is likewiſe a crooked tube AB (fig. 5.) to be put occaſionally upon the mouth of the kneed tube F, in order to prevent rain from being blown into the mouth of the wind-gage when it is left out all night, or expoſed in the time of rain.

The force or momentum of the wind may be aſcertained by the aſſiſtance of this inſtrument, by filling the tubes half full of water, and puſhing the ſcale a little up or down, till the o of the ſcale, when the inſtrument is held up perpendicularly, be on a line with the ſurface of the water in both legs of the wind-gage. The inſtrument being thus adjuſted, hold it up perpendicularly, and turning the mouth of the kneed tube towards the wind, obſerve how much the water is depreſſed by it in the one leg, and raiſed in the other. The ſum of the two is the height of a column of water, which the wind is capable of ſuſtaining at that time; and every body that is oppoſed to that wind will be preſſed upon by a force equal to the weight of a column of water, having its baſe equal to the altitude of the column of water ſuſtained by the wind in the wind-gage. Hence the force of the wind upon any body where the ſurface oppoſed to it is known, may be eaſily found; and a ready compariſon may be made betwixt the ſtrength of one gale of wind and that of another.

The force of the wind may be likewiſe meaſured with this inſtrument, by filling it until the water runs out at the hole G. For if we then hold it up to the wind as before, a quantity of water will be blown out; and if both legs of the inſtrument are of the ſame bore, the height of the column ſuſtained will be equal to double the column of water in either leg, or the ſum of what is wanting in both legs. But if the legs are of unequal bores, neither of theſe will give the true height of the column of water which the wind ſuſtained. But the true height may be obtained by the following formulæ.

Suppoſe that after a gale of wind which had blown the water from A to B (fig. 6.), forcing it at the ſame time through the other tube out at E, the ſurface of the water ſhould be found ſtanding at ſome level D G, and it were required to know what was the height of the column E F or A B, which the wind ſuſtained. In order to obtain this, it is only neceſſary to find the height of the columns D B or G F, which are conſtantly equal to one another; for either of theſe added to one of the equal columns A D, E G, will give the true height of the column of water which the wind ſuſtained.

1. Let the diameters A C, E H, of the tubes, be reſpectively repreſented by cd; and let $a=$AD, or EG, and $x=$D B, or G F: Then it is evident that the column D B is to the column E G, as c^2x to d^2a. But theſe columns are equal. Therefore $c^2x=d^2a$; and conſequently $x=\frac{d^2a.}{c^2}$

2. But if at any inſtant of time whilſt the wind was blowing, it was obſerved, that, when the water ſtood at E, the top of the tube out of which it is forced, it was depreſſed in the other to ſome given level BF, the altitude at which it would have ſtood in each had it immediately ſubſided, may be found in the following manner.—Let $b=$AB or EF.—Then it is evident that the column DB is equal to the difference of columns EF, GF. But the difference of theſe columns is as d^2b-d^2x; and conſequently $x=\frac{d^2b}{c^2+d^2}$.

For the caſes when the wind blows in at the narrow leg of the inſtrument; Let A B$=$E F$=b$, E G, or AD$=a$, GF$=$DB$=x$, and the diameters EH, GA, reſpectively $=d$, c, as before. Then it is evident, that the column A D is to the column GF as ac^2 to d^2x. But theſe columns are equal; therefore $d^2x=ac^2$; and conſequently $x=\frac{ac^2}{d^2}$. It is alſo evident, that the column A D is equal to the difference of the columns AB, DB; but the difference of theſe columns is as bc^2-c^2x. Therefore $d^2x=bc^2-c^2x$. Whence we get $x=\frac{bc^2}{d^2+c^2}$.

The uſe of the ſmall tube of communication ab (fig. 4.), is to check the undulation of the water, ſo that the height of it may be read off from the ſcale with eaſe and certainty. But it is particularly deſigned to prevent the water from being thrown up to a much greater or leſs altitude, than the true height of the column which the wind is able at that time to ſuſtain, from its receiving a ſudden impulſe whilſt it is vibrating either in its aſcent or deſcent. As in ſome caſes the water in this inſtrument might be liable to freeze, and thus break the tubes, Dr Lind recommends a ſaturated ſolution of ſea-ſalt to be uſed inſtead of it, which does not freeze till Fahrenheit's thermometer falls to 0.

GAHNIA, in botany: A genus of the monogynia order, belonging to the hexandria claſs of plants. The calyx is an involucrum with two or five flowers; the corolla is two-valved; the ſtamina ſix capillary and very ſhort filaments; the antheræ linear, ſharp-pointed at the apex, and as long as the corolla; there is no pericarpium: the ſeed is ſingle and oblong.

GAIETA, an ancient, handſome, and ſtrong town of Italy, in the kingdom of Naples, and in the Terra di Lavoro, with a fort, citadel, harbour, and biſhop's ſee. It was taken by the Auſtrians in 1707, and by the Spaniards in 1734. It is ſeated at the foot of a mountain near the ſea, in E. Long. 13. 37. N. Lat. 41. 30.

GAIN, the profit or lucre a perſon reaps from his trade, employment, or induſtry. Some derive the word from the German *gewin*: whereof the Italians had made *guadaguo*; the French and Engliſh *gain*.

There are legal and reputable gains, as well as ſordid and infamous ones. What is gained beyond a certain ſum, by gaming, is all liable to be reſtored again, if the loſer will take the benefit of the law.

GAIN, in architecture, is the workmens term for the bevelling ſhoulder of a joiſt or other timber. It is uſed, alſo, for the lapping of the end of the joiſt, &c. upon a trimmer or girder; and then the thickneſs of the ſhoulder is cut into the trimmer, alſo bevelling upwards, that it may juſt receive the gain; and ſo the joiſt and trimmer lie even and level with the ſurface. This way of working is uſed in floors and hearths.

To GAIN the wind, in ſea-language, is to arrive on the weather-ſide or to windward, of ſome other veſſel in ſight, when both are plying to windward, or ſailing as near the wind as poſſible.

GAINAGE, GAINAGIUM, in ancient writers, ſignifies the draught-oxen, horſes, wain, plough, and furniture, for carrying on the work of tillage by the baſer ſort of ſokemen and villains.

Gainage is the ſame with what is otherwiſe called *wainage*. Bracton, lib. i. cap. 9. ſpeaking of lords and ſervants, ſays, *Ut ſi eos deſtruant, quod ſalvum non poſſit eis eſſe wainagium ſuum*. And again, lib. iii. tract. 2.

cap. 1. *Villanus non amerciabitur, niſi ſalvo wainagio ſuo.* For anciently, as it appears both by Magna Charta and other books, the villain, when amerced, had his gainage or wainage free; to the end his plough might not ſtand ſtill: and the law, for the ſame reaſon, does ſtill allow a like privilege to the huſbandman; that is, his draught-horſes are not in many caſes diſtrainable.

Gainage is alſo uſed for the land itſelf, or the profit raiſed by cultivating it.

GAINSBOROUGH, a town of Lincolnſhire in England 150 miles from London, ſeated on the river Trent near the ſea. It is a large well built town, with a pretty good trade, and has the title of an earldom. W. Long. 0 40. N. Lat. 53. 26. The north marſh in its neighbourhood is noted for horſe-races. The Danes who invaded the kingdom brought their ſhips up to this place. It was here that Sweno the Dane was murdered by one of the Engliſh, who was never diſcovered.

GALACTITES, in the hiſtory of foſſils, a ſubſtance much reſembling the morochthus or French chalk, in many reſpects; but different from it in colour. The ancients found it in the Nile and in ſome rivers in Greece, and uſed it in medicine as an aſtringent, and for defluxions and ulcers of the eyes. At preſent it is common in Germany, Italy, and ſome parts of France, and is wholly overlooked, being eſteemed a worſe kind of morochthus. See Morochthus.

GALACTOPHAGI, and Galactopotæ in antiquity, perſons who lived wholly on milk, without corn or the uſe of any other food. The words are compounded of γαλα, γαλακτος, *milk*; θαγειν, *to eat* and ποτης of πινω, *I drink.*

Certain nations in Scythia Aſiatica, as the Getæ, Nomades, &c. are famous, in ancient hiſtory, in quality of *galactophagi*, or milk-eaters. Homer makes their eloge, Iliad, lib. iii.

Ptolemy, in his geography, places the Galactophagi between the Riphæan mountains on one ſide, and the Hircanian ſea on the other.

GALANGALS, in the materia medica. See Kæmpferia.

GALANTHUS, the Snow-drop, in botany: A genus of the monogynia order, belonging to the hexandria claſs of plants; and in the natural method ranking under the ninth order, *Spathaceæ*. There are three concave petals, and the nectarium conſiſts of three ſmall emarginated petals; the ſtigma is ſimple. There is but one ſpecies, viz. the nivalis; which is a bulbous-rooted flowery perennial, riſing but a few inches in height, and adorned at top with ſmall tripetalous flowers of a white colour. There are three varieties, viz. the common ſingled-flowered ſnow-drop, the ſemi-double ſnow-drop, and the double ſnow-drop. They are beautiful little plants; and are much valued on account of their early appearance, often adorning the gardens in January or February, when ſcarce any other flower is to be ſeen. They frequently burſt forth when the ground is covered with ſnow, and continue very often till the beginning of march, making a very ornamental appearance, eſpecially when diſpoſed in cluſters towards the fronts of the borders, &c. The ſingle kind comes firſt into bloom, then the ſemi-double, and after that the double. They will ſucceed any where, and multiply exceedingly by off-ſets from the roots.

GALATA, a great ſuburb belonging to Conſtantinople, oppoſite to the ſeraglio, on the other ſide of the harbour. It is here the Greeks, Armenians, Franks, Chriſtians, and Jews inhabit, and are allowed the exerciſe of their reſpective worſhips.

GALATÆA and Galathæa, (fab. hiſt.), a ſea-nymph, daughter of Nereus and Doris. She was paſſionately loved by the Cyclops Polyphemus, whom ſhe treated with coldneſs and diſdain; while Acis, a ſhepherd of Sicily enjoyed her unbounded affection. The happineſs of theſe two lovers was diſturbed by the jealouſy of the Cyclops, who cruſhed his rival to pieces with a piece of a broken rock while he repoſed on the boſom of Galatæa. The nymph was inconſolable for the loſs of Acis; and as ſhe could not reſtore him to life, ſhe changed him into a fountain.

GALATIA, the ancient name of a province of Aſia Minor, now called *Amaſia*. It was bounded on the eaſt by Cappadocia, on the weſt by Bithynia, on the ſouth by Pamphylia, and on the north by the Euxine ſea. It was the north part of Phrygia Magna; but upon being occupied by the Gauls was called *Galatia*; and becauſe ſituated amidſt Greek colonies, and itſelf mixed with Greeks, *Gallogræcia*. Strabo calls it *Galatia*, and *Gallogræcia*: hence a two-fold name of the people; *Galatæ* and *Gallogræci*. The Greeks called it *Gallia Parva*; to diſtinguiſh it from the *Tranſalpina*, both which they called *Galatia*. It was reduced under the ſubjection of the Romans in the time of Auguſtus, and is now in the hands of the Turks. Here St Paul founded a church, to which he directed that epiſtle which is ſtill known by the name of the *Epiſtle to the Galatians*, and was written to reclaim them from the obſervation of Jewiſh ordinances, into which they had been ſeduced by ſome falſe teachers.

GALAX, in botany: A genus of the monogynia order, belonging to the pentandria claſs of plants; and in the natural method ranking with thoſe of which the order is doubtful. The corolla is ſalver-ſhaped; the calyx decaphyllous; the capſule unilocular, bivalved, and elaſtic.

GALAXY, in aſtronomy, that long, white, luminous track, which ſeems to incompaſs the heavens like a ſwath, ſcarf, or girdle: and which is eaſily perceivable in a clear night, eſpecially when the moon does not appear. The Greeks call it Γαλαξιας, *Galaxy*, of Γαλα, γαλακτος, *Milk*; on account of its colour and appearance: the Latins, for the ſame reaſons, call it *via lactea*; and we, the *milky-way*. It paſſes between Sagittarius and Gemini, and divides the ſphere into two parts; it is unequally broad; and in ſome parts is ſingle; in others double.

The ancient poets, and even philoſophers, ſpeak of the Galaxy, as the road or way by which the heroes went to heaven.

Ariſtotle makes it a kind of meteor, formed of a crowd of vapours, drawn into that part by certain large ſtars diſpoſed in the region of the heavens anſwering hereto.

Others, finding that the Galaxy was ſeen all over the globe, that it always correſponded to the ſame fixed ſtars, and that it tranſcended the height of the higheſt planets, ſet aſide Ariſtotle's opinion, and placed the Galaxy in the firmament, or region of the fixed ſtars, and concluded it to be nothing but an aſſemblage of an infinite number of minute ſtars.

Since the invention of the teleſcope, this opinion has been abundantly confirmed. By directing a good teleſcope to any part of the milky-way; where, before, we only ſaw a confuſed whiteneſs, we now deſcry an innumerable multitude of little ſtars, ſo remote, that a naked eye confounds them. See Astronomy, nº 119.

GALBA (Servius Sulpicius), a Roman emperor, born the 24th of December, five years before the Chriſtian era. He was gradually raiſed to the greateſt offices of the ſtate, and exerciſed his power in the provinces with the greateſt equity and unremitted diligence. He dedicated the greateſt part of his time to ſolitary purſuits, chiefly to avoid the ſuſpicions of Nero. His diſapprobation of the emperor's oppreſſive command in the provinces was the cauſe of new diſturbances. Nero ordered him to be put to death; but he eſcaped from the hands of the executioner, and was publicly ſaluted emperor. When he was ſeated on the throne, he ſuffered himſelf to be governed by favourites, who expoſed the goods of the citizens to ſale to gratify their avarice. Exemptions were ſold at a high price; and the crime of murder was blotted out, and impunity purchaſed with a large ſum of money. Such irregularities in the emperor's miniſters greatly diſpleaſed the people; and when Galba refuſed to pay the ſoldiers the money which he had promiſed them when he was raiſed to the throne, they aſſaſſinated him in 73d year of his age, and the eighth month of his reign. The virtues which had ſhone ſo bright in Galba when a private man, totally diſappeared when he aſcended the throne; and he who ſhowed himſelf the moſt impartial judge, forgot the duties of an emperor and of a father of his people.

GALBANUM, in pharmacy, a gum iſſuing from the ſtem of an umbelliferous plant growing in Perſia and many parts of Africa. See Bubon.

The juice, as brought to us, is ſemipellucid, ſoft, tenacious; of a ſtrong, and to ſome unpleaſant, ſmell; and a bitteriſh warm taſte: the better ſort is in pale coloured maſſes, which, on being opened, appear compoſed of clear white tears. Geoffroy relates, that a dark greeniſh oil is to be obtained from this ſimple by diſtillation, which, upon repeated rectifications, becomes of an elegant ſky blue colour. The purer ſorts of galbanum are ſaid by ſome to diſſolve entirely in wine, vinegar, or water; but theſe liquors are only partial menſtrua with regard to this drug; nor do ſpirit of wine or oils prove more effectual in this reſpect: the beſt diſſolvent is a mixture of two parts ſpirit of wine and one of water. Galbanum agrees in virtue with gum ammoniacum; but is generally accounted leſs efficacious in aſthmas, and more ſo in hyſterical complaints. It is an ingredient in the gum pills, the gum plaſter, and ſome other officinal compoſitions.

GALE, in the ſea-language, a term of various import. When the wind blows not ſo hard but that a ſhip may carry her top-ſails a-trip (that is, hoiſted up to the higheſt), then they ſay it is a loom-gale. When it blows very ſtrong, they ſay it is a ſtiff, ſtrong, or freſh gale. When two ſhips are near one another at ſea, and, there being but little wind blowing, one of them finds more of it than the other, they ſay that the one ſhip gales away from the other.

Gale (Dr John), an eminent and learned miniſter among the Baptiſts, was born at London in 1680. He ſtudied at Leyden, where he diſtinguiſhed himſelf very early, and afterwards at Amſterdam, under Dr Limborch. He was choſen miniſter of the Baptiſt congregation at Barbican; where his preaching, being chiefly practical, was greatly reſorted to by people of all perſuaſions. Four volumes of his ſermons were publiſhed after his death, which happened in 1721. His *Reflections on Dr Wall's Hiſtory of Infant-baptiſm*, is the beſt defence of the Baptiſts ever publiſhed, and the reading of that performance induced the learned Mr William Whiſton and Dr Foſter to become baptiſts.

Gale (Theophilus), an eminent nonconformiſt miniſter, born in 1628. He was invited to Wincheſter in 1657; and continued there a ſtated preacher until the re-eſtabliſhment of the church by Charles II. when he rather choſe to ſuffer the penalties of the act of conformity, than to ſubmit to it contrary to his conſcience. He was afterwards engaged by Philip lord Wharton as tutor to his ſons, whom he attended to an academy at Caen in Normandy; and when this duty was fulfilled, he became paſtor over a congregation of private conventiclers in Holborn. He died in 1678; and is principally known by an elaborate work, intitled, the *Court of the Gentiles*, calculated to ſhow, that the Pagan philoſophers derived their moſt ſublime ſentiments from the Scriptures.

Gale (Dr Thomas), a learned divine, born at Scruton in Yorkſhire, in the year 1636, was educated at Cambridge, and at length became profeſſor of the Greek language in that univerſity. He was afterwards choſen head maſter of St Paul's ſchool, London; and was employed by the city in writing thoſe elegant inſcriptions on the monument erected in memory of the conflagration in 1666. In 1676 he was collated to a prebend in the cathedral of St Paul's; and was likewiſe elected a fellow of the Royal Society, to which he preſented a Roman urn with its aſhes. About the year 1697, he gave to the new library of Trinity college, in Cambridge, a great number of Arabic manuſcripts; and in 1697 was admitted dean of York. He died in that city in 1702; and was interred in the cathedral, where a monument, with a Latin inſcription, was erected to his memory. He was a learned divine, a great hiſtorian, one of the beſt Greek ſcholars of his age, and maintained a correſpondence with the moſt learned men abroad as well as at home. He publiſhed, 1. *Hiſtoriæ Poeticæ Antiqui Scriptores*, octavo. 2. *Opuſcula Mythologica, Ethica, & Phyſica*, in Greek and Latin octavo. 3. *Herodoti Hiſtoria*, folio. 4. *Hiſtoriæ Anglicanæ Scriptores quinque*, in folio. 5. *Hiſtoriæ Britannicæ, Saxonicæ, Anglo-Danicæ. Scriptores quindecim*, in folio. 6. *Rhetores Selecti*, &c.

GALEA, in antiquity, a light caſque, head-piece, or morrion, coming down to the ſhoulders, and commonly of braſs; though Camillus, according to Plutarch, ordered thoſe of his army to be of iron, as being the ſtronger metal. The lower part of it was called *buccula*, and on the top was a creſt. The Velites wore a light galea, made of the ſkin of ſome wild beaſt to make it more terrible.

GALEASSE, a large low-built veſſel, uſing both

GAGES.

Plate CCV.

Fig. 2. Bucket Sea Gage.

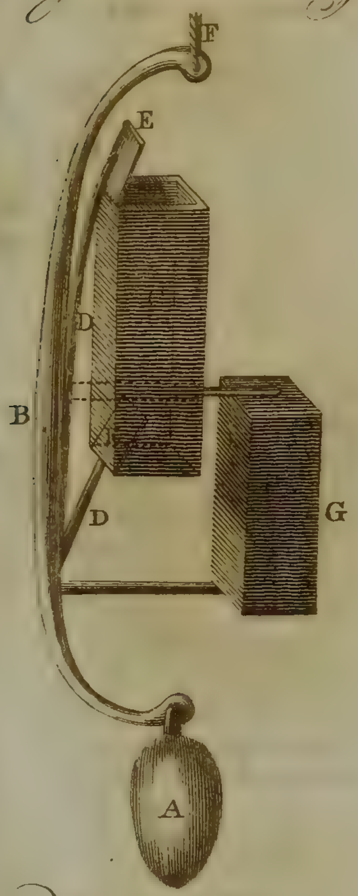
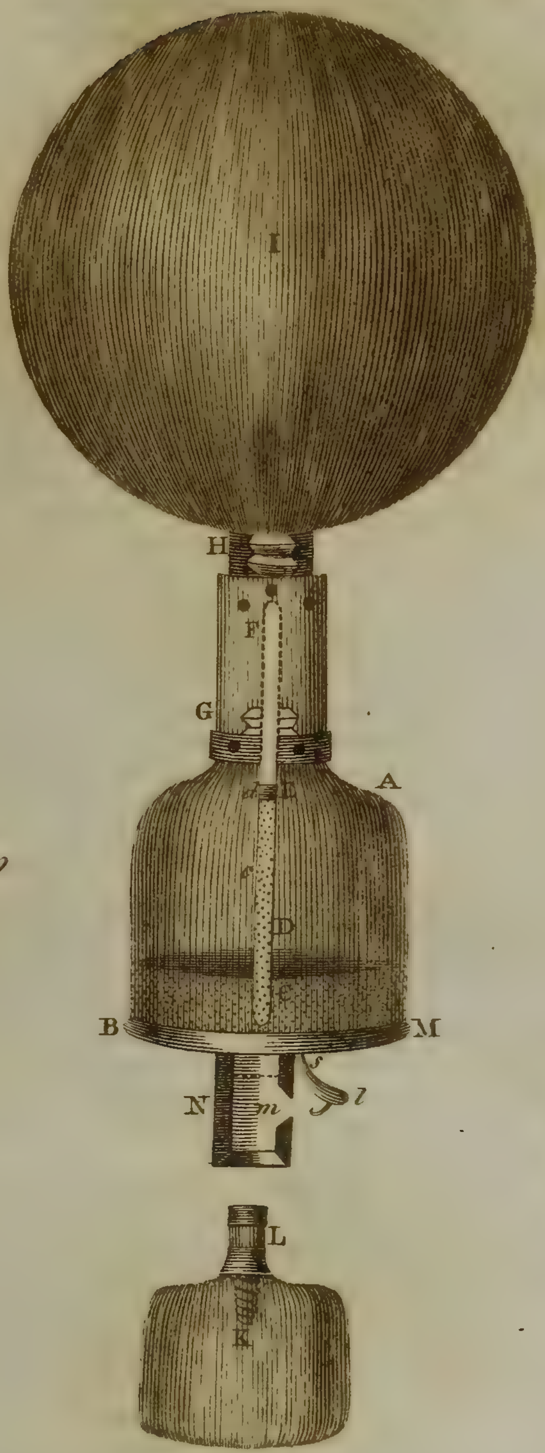


Fig. 1. Sea Gage.



N.o 2.

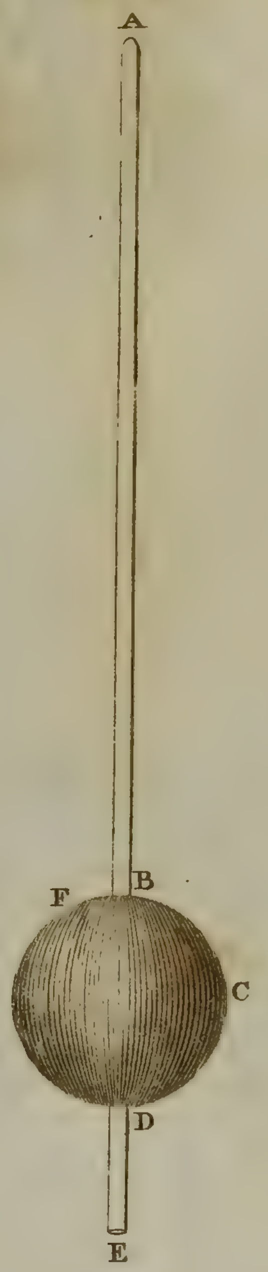


Fig. 4. Wind Gage.

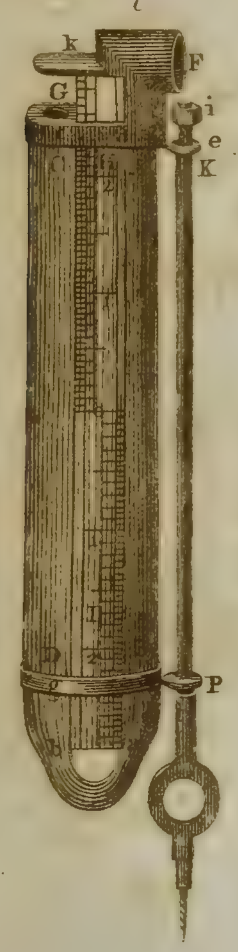


Fig. 3. Aqueo mercurial Gage.

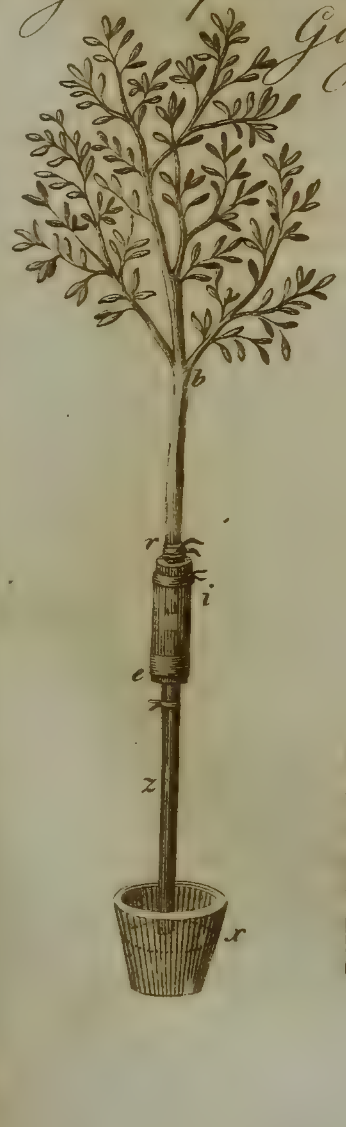


Fig. 5.

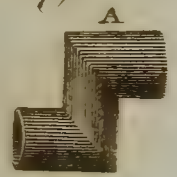
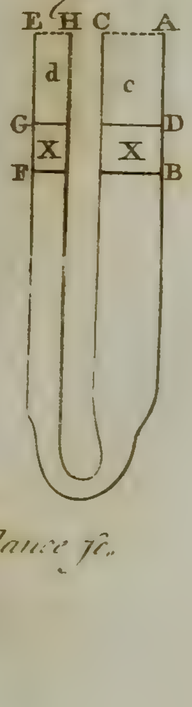
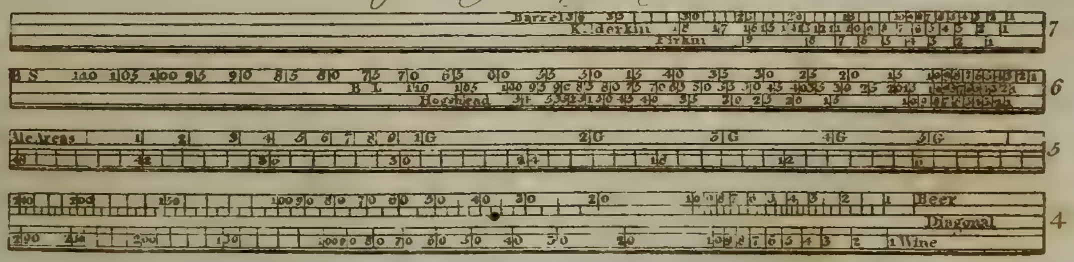


Fig. 6.



Four foot Gauging Rod.



Thackara & Vallance sc.

ſails and oars, and the biggeſt of all the veſſels that make uſe of the latter. It may carry twenty guns, and has a ſtern capable of lodging a great number of marines. It has three maſts, which are never to be lowered or taken down. It has alſo thirty-two benches of rowers; and to each bench ſix or ſeven ſlaves, who ſit under cover. This veſſel is at preſent uſed only by the Venetians.

GALEGA, in botany: A genus of the decandria order, belonging to the diadelphia claſs of plants; and in the natural method ranking under the 32d order, *Papilionaceæ*. The calyx is compoſed of ſubulated nearly equal dents or ſegments; the legumen has oblique ſtriæ, and ſeeds lying between them.

GALEN (Claudius), in Latin *Galenus*, prince of the Greek phyſicians after Hippocrates, was born at Pergamus in the Leſſer Aſia, about the year 131. His father was poſſeſſed of a conſiderable fortune; was well verſed in polite literature, philoſophy, aſtronomy, and geometry, and was alſo well ſkilled in architecture. He himſelf inſtructed his ſon in the firſt rudiments of learning, and afterwards procured him the greateſt maſters of the age in philoſophy and eloquence. Galen having finiſhed his ſtudies under their care, choſe phyſic for his profeſſion, and chiefly ſtudied the works of Hippocrates. Having at length exhauſted all the ſources of literature that were to be found at home, he reſolved to travel, in order to converſe with the moſt able phyſicians in all parts, intending at the ſame time to take every opportunity of inſpecting on the ſpot the plants and drugs of the countries through which he paſſed. With this view he went to Alexandria, and ſtaid ſome years in that metropolis of Egypt: from thence he travelled through Cilicia; paſſed through Paleſtine; viſited the iſles of Crete and Cyprus; and made two voyages to Lemnos, in order to examine the Lemnian earth, which was then eſteemed an admirable medicine. With the ſame view he went into the Lower Tyria, in order to obtain a thorough inſight into the nature of the opobalſamum, or balm of Gilead; and having completed his deſign, returned home by the way of Alexandria.

Galen had been four years at Pergamus, where his practice was attended with extraordinary applauſe, when ſome ſeditious commotions induced him to go to Rome, where he reſolved to ſettle: but the proofs he gave of his ſuperior ſkill, added to the reſpect ſhown him by ſeveral perſons of very high rank, created him ſo many enemies among his brethren of the faculty, that he was obliged to quit the city, after having reſided there four or five years. But he had not long returned to Pergamos, when he was recalled by the emperors Aurelius and Verus. After their death, he retired to his native country; where he died, about the year 200. He wrote in Greek; and is ſaid to have compoſed two hundred volumes, which were unhappily burnt in the temple of Peace. The beſt editions of thoſe that remain, are, that printed at Baſil in 1538, in five volumes, and that of Venice in 1625, in ſeven volumes. Galen was of a weak and delicate conſtitution, as he himſelf aſſerts: but he nevertheleſs, by his temperance and ſkill in phyſic, arrived to a great age; for it was his maxim, always to riſe from table with ſome degree of appetite. He is juſtly conſidered as the greateſt phyſician of antiquity, next to Hippocrates; and he performed ſuch ſurpriſing cures, that he was accuſed of magic.

GALEN, a name given by mineraliſts to a ſpecies of poor lead-ore. It was alſo the original name given by Andromachus to the theriaca, from its effect in bringing on a pleaſing calm over the blood and ſpirits on taking it.

GALENIA, in botany: A genus of the digynia order, belonging to the octandria claſs of plants; and in the natural method ranking under the 13th order, *Succulentæ*. The calyx is trifid; there is no corolla; the capſule is roundiſh and diſpermous.

GALENIC, or GALENICAL, in medicine, is that manner of conſidering and treating diſeaſes, founded on the principles of Galen, or introduced by GALEN. This author, collecting and digeſting what the phyſicians before him had done, and explaining every thing according to the ſtricteſt doctrine of the Peripatetics, ſet phyſic on a new footing: he introduced the doctrine of the four elements; the cardinal qualities and their degrees; and the four humours or temperaments.

GALENIC is more frequently uſed as contradiſtinguiſhed from *chemical*.

The diſtinction of *galenical* and *chemical* was occaſioned by a diviſion of the practitioners of medicine into two ſects, which happened on the introduction of chemiſtry into medicine. Then the chemiſts, arrogating to themſelves every kind of merit and ability, ſtirred up an oppoſition to their pretenſions, founded on the invariable adherence of the other party to the ancient practice. And though this divſion into the two ſects of galeniſts and chemiſts has long ceaſed, yet the diſtinction of medicines which reſulted from it is ſtill retained.

Galenical medicines are thoſe which are formed by the eaſier preparations of herbs, roots, &c. by infuſion, decoction, &c. and by combining and multiplying ingredients; while thoſe of chemiſtry draw their more intimate and remote virtues by means of fire and elaborate preparations, as calcination, digeſtion, fermentation, &c.

GALENISTS, a denomination given to ſuch phyſicians as practiſe, preſcribe, or write, on the galenical principles; and ſtand oppoſed to the *chemiſts*. See GALENICAL. At preſent the galeniſts and chemiſts are pretty well accommodated; and moſt of our phyſicians uſe the preparations and remedies of both.

GALENISTS, or *Galenites*, in church-hiſtory, a branch of Mennonites or Anabaptiſts, who take in ſeveral of the opinions of the Socinians, or rather Arians, touching the divinity of our Saviour. In 1664 the Waterlandians were divided into two parties, of which the one were called *Galeniſts*, and the other *Apoſtolians*. They are thus called from their leader Abr. Galenus, a learned and eloquent phyſician of Amſterdam, who conſidered the Chriſtian religion as a ſyſtem that laid much leſs ſtreſs on faith than practice; and who was for taking into the communion of the Mennonites all thoſe who acknowledged the divine origin of the books of the Old and New Teſtament, and led holy and virtuous lives.

GALEON. See GALLEON.

GALEOPSIS, in botany: A genus of the angioſpermia order, belonging to the didynamia claſs of plants; and in the natural method ranking under the

42d order, *virticillatæ*. The upper lip of the corolla is a little crenated or arched; the under lip more than bidentate.

GALERICULUM, was a cap worn both by men and women amongſt the ancient Romans. It conſiſted of ſkin, which was ſo neatly dreſſed with human hair, that the artificial covering could ſcarcely be diſtinguiſhed from the natural. It was uſed by thoſe whoſe hair was thin; and by wreſtlers, to keep their own hair from receiving any injury from the naſty oils with which they were rubbed all over before they exerciſed. It ſeems to have reſembled our wigs.

GALIC, or *Gaelic, Language*. See HIGHLANDS.

GALICIA, a province of Spain, bounded on the north and weſt by the ocean, on the ſouth by Portugal, and on the eaſt by Aſturias and the kingdom of Leon. The air is temperate along the coaſt; but, in other places, it is cold and moiſt. It is but thin of people; and the produce is wine, flax, and citrons: here alſo are good paſtures, copper, and lead, and the foreſts yield wood for building of ſhips. St Jago di Compoſtella is the capital town.

GALILEE, once a province of Judea, now of Turkey in Aſia, was bounded by mount Lebanon on the north, by the river Jordan and the ſea of Galilee on the eaſt, by the Chiſon on the ſouth, and by the Mediterranean on the weſt. It was the ſcene of many of our Saviour's miracles; but the bounds of the country are not now well known, nor yet the places where many of the towns ſtood.

GALILEANS, a ſect of the Jews. Their founder was one Judas a native of Galilee, from which place they derived their name. Their chief, eſteeming it an indignity for the Jews to pay tribute to ſtrangers, raiſed up his countrymen againſt the edict of the emperor Auguſtus, which had ordered a taxation or enrolment of all the ſubjects of the Roman empire.

They pretended that God alone ſhould be owned as Maſter and Lord, and in other reſpects were of the opinion of the Phariſees; but, as they judged it unlawful to pray for infidel princes, they ſeparated themſelves from the reſt of the Jews, and performed their ſacrifices apart.

As our Saviour and his apoſtles were of Galilee, they were ſuſpected to be of the ſect of Galileans; and it was on this principle, as St Jerome obſerves, that the Phariſees laid a ſnare for him; aſking, Whether it was lawful to give tribute to Cæſar; that in caſe he denied it, they might have an occaſion of accuſing him.

GALILEO (Galilei), the famous mathematician and aſtronomer, was the ſon of a Florentine nobleman, and born in the year 1564. He had from his infancy a ſtrong inclination to philoſophy and the mathematics; and made prodigious progreſs in theſe ſciences. In 1592, he was choſen profeſſor of mathematics at Padua; and during his abode there he *invented*, it is ſaid, the teleſcope; or, according to others, improved that inſtrument, ſo as to make it fit for aſtronomical obſervations: (See ASTRONOMY, p. 423, col. 1.) In 1611, Coſmo II. grand duke of Tuſcany ſent for him to Piſa, where he made him profeſſor of mathematics, with a handſome ſalary; and ſoon after inviting him to Florence, gave him the office and title of *principal philoſopher and mathematician to his highneſs*,

He had been but a few years at Florence, before he was convinced by ſad experience, that Ariſtotle's doctrine, however ill-grounded, was held too ſacred to be called in queſtion. Having obſerved ſome ſolar ſpots in 1612, he printed that diſcovery the following year at Rome; in which, and in ſome other pieces, he ventured to aſſert the truth of the Copernican ſyſtem, and brought ſeveral new arguments to confirm it. For theſe he was cited before the inquiſition; and, after ſome months impriſonment, was releaſed upon a ſimple promiſe, that he would renounce his heretical opinions, and not defend them by word or writing. But having afterwards, in 1632, publiſhed at Florence his "Dialogues of the two greateſt ſyſtems of the world, the Ptolemaic and Copernican," he was again cited before the inquiſition, and committed to the priſon of that eccleſiaſtical court at Rome. In June 32d N. S. that year, the congregation convened; and in his preſence pronounced ſentence againſt him and his books, obliging him to abjure his errors in the moſt ſolemn manner; committed him to the priſon of their office during pleaſure; and enjoined him, as a ſaving penance, for three years to come, to repeat once a-week the ſeven penitential pſalms: reſerving to themſelves, however, the power of moderating, changing, or taking away altogether or in part, the abovementioned puniſhment and penance. On this ſentence, he was detained a priſoner till 1634; and his "Dialogues of the ſyſtem of the World" were burnt at Rome.

He lived ten years after this, ſeven of which were employed in making ſtill farther diſcoveries with his teleſcope. But by the continual application to that inſtrument, added to the damage he received in his ſight from the nocturnal air, his eyes grew gradually weaker, till he became totally blind in 1639. He bore this calamity with patience and reſignation, worthy of a great philoſopher. The loſs neither broke his ſpirit, nor hindered the courſe of his ſtudies. He ſupplied the defect by conſtant meditation; whereby he prepared a large quantity of materials, and began to dictate his own conceptions; when, by a diſtemper of three months continuance, waſting away by degrees, he expired at Arcetti near Florence, in January 1642, N. S. in the 78th year of his age.

Among various uſeful inventions of which Galileo was the author, is that of the ſimple pendulum, which he had made uſe of in his aſtronomical experiments. He had thoughts of applying it to clocks; but did not execute it: the glory of that invention was reſerved for Vicenzio his ſon, who made the experiment at Venice in 1649; and M. Huygens afterwards carried this invention to perfection. He wrote a great number of treatiſes, ſeveral of which were publiſhed in a collection by Signor Mendeſſi, under the title of *L'opera di Galileo Galilei Lynceo.* Some of theſe, with others of his pieces, were tranſlated into Engliſh and publiſhed by Thomas Saliſbury, Eſq; in his mathematical collections, &c. in two volumes folio. A volume alſo of his letters to ſeveral learned men, and ſolutions of ſeveral problems, were printed at Bologna in quarto. Beſides theſe, he wrote many others, which were unfortunately loſt through his wife's devotion; who, ſolicited by her confeſſor, gave him leave to peruſe her huſband's manuſcripts; of which he tore and took away as many as he ſaid were not fit to be publiſhed.

GALINACEUS LAPIS. See GALLINACEUS.

GALIUM, in botany: A genus of the monogynia order, belonging to the tetrandria claſs of plants; and in the natural method ranking under the 47th order, *Stellatæ*. The corolla is monopetalous and plain; and there are two roundiſh ſeeds. There are a great many ſpecies; of which the moſt remarkable are, the *verum*, or yellow lady's bed-ſtraw; and the *aperine*, clivers, or gooſe-graſs. The former has a firm, erect, brown, ſquare, ſtem; the leaves generally eight in each whirl, linear, pointed, brittle, and often reflex; branches ſhort generally two from each joint, terminating in ſpikes of ſmall yellow flowers. It grows commonly in dry ground, and on road ſides. The flowers will coagulate boiling milk; and the beſt Cheſhire cheeſe is ſaid to be prepared with them. The French preſcribe them in hyſteric and epileptic caſes. Boiled in alum-water, they tinge wool yellow. The roots dye a red not inferior to madder; for which purpoſe they are uſed in the iſland of Jura. In the Edinburgh medical commentaries we have accounts of ſome violent ſcorbutic complaints being cured by the juice of this plant.—Sheep and goats eat the plant; horſes and ſwine refuſe it; cows are not fond of it. The aperine, or clivers, has a ſquare, very rough, jointed, very weak ſtem, two, three, or four feet long, and adheſive: the branches are oppoſite; the joints hairy at the baſe: the leaves, conſiſting of eight or ten at each joint, are narrow, pointed, above rough, beneath ſmooth, and carinated: the ſeeds are rough; flowers white, ſmall, few on ſlender foot-ſtalks on the tops of the branches. It is frequent in fields by the ſides of hedges, &c. The expreſſed juice of this plant taken internally, and the bruiſed leaves applied by way of poultice, are ſaid to have been uſed with ſucceſs as a cure for the cancer. The effects being ſlow, though ſure, the courſe, it is ſaid, often requires to be continued for nine or ten months.

GALL, in the animal economy. See BILE.

Gall, was generally given among the Jews, to perſons ſuffering death under the execution of the law, to make them leſs ſenſible of their pain; but gall and myrrh are ſuppoſed to have been the ſame thing; becauſe at our Saviour's crucifixion, St Matthew ſays, they gave him vinegar to drink mingled with gall; whereas St Mark calls it wine mingled with myrrh: The truth of the matter perhaps is, that they diſtinguiſhed every thing bitter by the name of gall. The Greeks and Romans alſo gave ſuch a mixture to perſons ſuffering a death of torture.

A great number of experiments have been made upon the gall of different animals, but few concluſions can be drawn from them with any certainty. Dr Percival, however, hath ſhown, that putrid bile may be perfectly corrected and ſweetened by an admixture of the vegetable acids, vinegar, and juice of lemons. Theſe, he obſerves, have this effect much more completely than the mineral ones: and hence, he thinks, ariſes the great uſefulneſs of the vegetable acids in autumnal diſeaſes; which are always attended with a putreſcent diſpoſition of the bile, owing to the heat of the preceding ſummer. On this occaſion he takes notice of a common miſtake among phyſicians, who frequently preſcribe elixir of vitriol in thoſe diſeaſes, where vinegar or lemon juice would be much more effectual.

From this effect of acids on the gall, he alſo thinks, we may ſee why the immoderate uſe of acids is ſo pernicious to digeſtion. It is neceſſary to health that the gall ſhould be in ſome degree acrid and alkaleſcent: but as acids have the property of rendering it perfectly mild and ſweet, they muſt be proportionably pernicious to the due concoction and aſſimilation of the food; which without an acrid bile cannot be accompliſhed. Hence the body is deprived of its proper nouriſhment and ſupport, the blood becomes vapid and watery, and a fatal cahexy unavoidably enſues. This hath been the caſe with many unfortunate perſons, who, in order to reduce their exceſſive corpulency, have indulged themſelves in the too free uſe of vinegar. From the mild ſtate of the gall in young children, Dr Percival alſo thinks it is, that they are ſo much troubled with acidities.

GALL Bladder. See ANATOMY, nº 97.

GALL, in natural hiſtory, denotes any protuberance or tumor produced by the puncture of inſects on plants and trees of different kinds.

Theſe galls are of various forms and ſizes, and no leſs different with regard to their internal ſtructure. Some have only one cavity, and others a number of ſmall cells communicating with each other. Some of them are as hard as the wood of the tree they grow on, whilſt others are ſoft and ſpongy; the firſt being termed *gall nuts*, and the latter *berry galls*, or *apple-galls*.

The general hiſtory of the gall is this. An inſect of the fly kind * is inſtructed by nature to take care for the ſafety of her young, by lodging her eggs in a woody ſubſtance, where they will be defended from all injuries: ſhe for this purpoſe wounds the leaves or tender branches of a tree; and the lacerated veſſels, diſcharging their contents, ſoon form tumors about the holes thus made. The external coat of this excreſcence is dried by the air; and grows into a figure which bears ſome reſemblance to the bow of an arch, or the roundneſs of a kernel. This little ball receives its nutriment, growth, and vegetation, as the other parts of the tree, by ſlow degrees, and is what we call the *gall-nut*. The worm that is hatched under this ſpacious vault, finds in the ſubſtance of the ball, which is as yet very tender, a ſubſiſtence ſuitable to its nature; gnaws and digeſts it till the time comes for its transformation to a nymph, and from that ſtate of exiſtence changes into a fly. After this, the inſect, perceiving itſelf duly provided with all things requiſite, diſengages itſelf ſoon from its confinement, and takes its flight into the open air. The caſe, however, is not ſimilar with reſpect to the gall-nut that grows in autumn. The cold weather frequently comes on before the worm is transformed into a fly, or before the fly can pierce through its incloſure. The nut falls with the leaves: and although you may imagine that the fly which lies within is loſt, yet in reality it is not ſo; on the contrary, its being covered up ſo cloſe, is the means of its preſervation. Thus it ſpends the winter in a warm houſe, where every crack and cranny of the nut is well ſtopped up; and lies buried as it were under a heap of leaves, which preſerves it from the injuries of the weather. This apartment, however, though ſo commodious a retreat in the winter, is a perfect priſon in the ſpring. The fly, rouſed out of its lethargy by the firſt heats, breaks its way through, and ranges where it pleaſes. A very ſmall aperture is ſufficient, ſince at this time the fly is but a diminutive creature. Beſides the ringlets whereof its body is compoſed, dilate and become pliant in the paſſage.

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* See *Cynips*.

Oak galls put, in a very ſmall quantity, into a ſolution of vitriol in water, though but a very weak one, give it a purple or violet colour: which, as it grows ſtronger, becomes black; and on this property depends the art of making our writing ink, as alſo the arts of dying and dreſſing leather, and other manufactures. See Ink.

The beſt galls come from Aleppo: theſe are not quite round and ſmooth like the other ſorts, but have ſeveral tubercles on the ſurface. Galls have a very auſtere ſtyptic taſte, without any ſmell: they are very ſtrong aſtringents, and as ſuch have been ſometimes made uſe of both internally and externally, but are not much taken notice of by the preſent practice. Some recommend an ointment of powdered galls and hog's lard as very effectual in certain painful ſtates of hæmorrhois; and it is alleged, that the internal uſe of galls has cured intermittents after the Peruvian bark has failed. A mixture of galls with a bitter and aromatic has been propoſed as a ſubſtitute for the bark.

Gall (St), a conſiderable town in Swiſſerland, and in the Upper Thurgow, with a rich and celebrated abbey, whoſe abbot is a prince of the empire. This place has for ſome time been a republic, in alliance with the Cantons. It is not very large; but is well built, neat, populous. It contains about 10,000 inhabitants, who are chiefly employed in the linen manufacture; and make annually, it is ſaid, 40,000 pieces of linen, of 200 ells each; which renders it one of the richeſt towns in Swiſſerland. The inhabitants are Proteſtants; for which reaſon there are often great conteſts between them and the abbey about religious affairs. It is ſeated in a narrow barren valley, between two mountains, and upon two ſmall ſtreams. E. Long. 29. 5. N. Lat. 47. 38.

Gall-Fly. See Cynips.

GALLA, an Abyſſinian nation, originally dwelling, as Mr Bruce ſuppoſes, under the line, and exerciſing the profeſſion of ſhepherds, which they ſtill continue to do. For a number of years, our author tells us, they have been conſtantly migrating northwards, though the cauſe of this migration is not known. At firſt they had no horſes; the reaſon of which was, that the country they came from did not allow theſe animals to breed: but as they proceeded northward and conquered ſome of the Abyſſinian provinces, they ſoon furniſhed themſelves with ſuch numbers, that they are now almoſt entirely cavalry, making little account of infantry in their armies. On advancing to the frontiers of Abyſſinia, the multitude divided, and part directed their courſe towards the Indian Ocean; after which, having made a ſettlement in the eaſtern part of the continent, they turned ſouthward into the countries of Bali and Dawaw, which they entirely conquered, and ſettled there in the year 1537. Another divſion having taken a weſterly courſe, ſpread themſelves in a ſemicircle along the banks of the Nile; ſurrounding the country of Gojam, and paſſing eaſtward behind the coutry of the Agows, extended their poſſeſſions as far as the territories of the Gongas and Gafats. Since that time the Nile has been the boundary of their poſſeſſions; though they have very frequently plundered, and ſometimes conquered, the Abyſſinian provinces on the other ſide of the river, but have never made any permanent ſettlement in theſe parts. A third diviſion has ſettled to the ſouthward of the low country of Shoa, which the governor of that province has permitted, in order to form a barrier betwixt him and the territories of the emperor, on whom he ſcarcely acknowledges any dependence.

The Galla are of a brown complexion, and have long black hair; but ſome of them who live in the valleys are entirely black. At firſt their common food was milk and butter; but ſince their intercourſe with the Abyſſinians, they have learned to plough and ſow their land, and to make bread. They ſeem to have a predilection for the number ſeven, and each of the three diviſions already mentioned are ſubdivided into ſeven tribes. In their behaviour they are extremely barbarous; and live in continual war with the Abyſſinians, whom they murder without mercy as often as they fall into their hands. They cut off the privities of the men, and hang them up in their houſes by way of trophies; and are ſo cruel as to rip up women with child, in hopes of thus deſtroying a male. Yet notwithſtanding their exceſſive cruelty abroad, they live under the ſtricteſt diſcipline at home; and every broil or quarrel is inſtantly puniſhed according to the nature of the offence. Each of the three diviſions of the Galla abovementioned has a king of its own; and they have alſo a kind of nobility, from among whom the ſovereign can only be choſen: however, the commonalty are not excluded from riſing to the rank of nobles if they diſtinguiſh themſelves very much in battle. None of the nobility can be elected till upwards of 40 years of age, unleſs he has with his own hand killed a number of enemies which added to his own age makes up 40. There is a council of each of the ſeven tribes, which meets ſeparately in its own diſtrict, to ſettle how many are to be left behind for the governing and cultivating of the territory, and other matters of importance. Theſe nations have all a great veneration for a tree which grows plentifully in their country, called *wanzey*, and which theſe ſuperſtitious people are even ſaid to adore as a god. Their aſſemblies for the choice of a king are all held under one of theſe trees; and when the ſovereign is choſen, they put a bludgeon of this wood in his hand by way of ſceptre, and a garland of the flowers upon his head.

The Galla are reported to be very good ſoldiers, eſpecially in caſes of ſurpriſe; but, like moſt other barbarians, have no conſtancy nor perſeverance after the firſt attack. They will, however, perform extraordinary marches, ſwimming rivers holding by the horſe's tail, and thus being enabled to do very great miſchief by reaſon of the rapidity of their movements. They are excellent light-horſe for a regular army in an hoſtile country; but are very indifferently armed on account of the ſcarcity of iron among them. Their principal arms are lances made of wood ſharpened at the end and hardened in the fire; and their ſhields are compoſed only of one ſingle fold of bull's hide; ſo that they are extremely apt to warp by heat, or become too ſoft in wet weather. They are exceedingly cruel; and make a ſhrill horrid noiſe at the beginning of every engagement, which greatly terrifies the horſes, and very often the barbarous riders which oppoſe them.

The Galla, according to Mr Bruce's account, are ſomewhat below the middle ſize, but extremely light and nimble. The women are fruitful; and ſuffer ſo little in child-bearing, that they do not even confine themſelves for a ſingle day after delivery. They plough, ſow, and reap the corn, which is trodden out by the cattle; but the men have all the charge of the cattle in the fields. In their cuſtoms they are filthy to the laſt degree; plaiting their hair with the guts of oxen, which they likewiſe twiſt round their middle, and which by the quick putrefaction occaſion an abominable ſtench. They anoint their heads and whole bodies with butter or greaſe; in which, as well as in other reſpects, they greatly reſemble the Hottentots. It has been ſuppoſed that they have no religion whatever; but Mr Bruce is of opinion that this is a miſtake. The wanzey, he ſays, is undoubtedly worſhipped by all the nations as a god; and they have likewiſe certain ſtones which are worſhipped as gods: beſides theſe, they worſhip the moon, and ſome ſtars, when in certain poſitions, and at ſome particular ſeaſons of the year. They all believe in a reſurrection; and have ſome faint notions of a ſtate of happineſs, but no idea of future puniſhment. Some of them to the ſouthward profeſs the Mahometan religion, but thoſe to the eaſt and weſt are generally pagans. All of them intermarry with each other; but will not allow ſtrangers to live among them, though the Moors have at laſt found out a method of trading ſafely with them. The commodities they deal in are blue Surat cloths, myrrh, and ſalt; the laſt being the moſt valuable article.

The marriages among the Galla are celebrated with ſome of the diſguſting cuſtoms of the Hottentots; and after theſe ceremonies the bridegroom promiſes to give the bride meat and drink while ſhe lives, and to bury her when dead. Polygamy is allowed among them; but it is ſingular, that among theſe people the women ſolicit their huſbands to take others to their embraces. The reaſon of this cuſtom is, that the men may have numerous families of children, who may be capable of defending them againſt their enemies; as the Galla, according to our author, always fight in families, whether againſt foreign enemies or with one another.

GALLAND (Anthony), a learned antiquarian, member of the Academy of Inſcriptions, and profeſſor of Arabic in the Royal College of Paris, was born of poor parents at Rollo, a village in Picardy. Having ſtudied at the Sorbonne and other univerſities, he travelled into the eaſt; where he acquired great ſkill in the Arabic tongue, and in the manners of the Mahometans. He wrote ſeveral works; the principal of which are, 1. An Account of the Death of the Sultan Oſman, and the Coronation of the Sultan Muſtapha. 2. A Collection of Maxims, drawn from the works of the Orientals. 3. A Treatiſe on the Origin of Coffee. 4. The Arabian Nights Entertainments, &c.

GALLANT, or GALANT, a French term adopted into our language, and ſignifying polite, civil, and well-bred, with a diſpoſition to pleaſe, particularly the ladies. It alſo ſignifies brave or courageous.

GALLE, the name of ſeveral engravers, of whom the principal was Cornelius, who flouriſhed about the year 1600. He learned the art of engraving from his father, and imitated his ſtiff ſtyle, till he went to Rome, where he reſided a conſiderable time, and there acquired that freedom, taſte, and correctneſs of drawing, which are found in his beſt works. He ſettled at Antwerp upon his return from Italy, where he carried on a conſiderable commerce in prints. His beſt prints are thoſe done after Rubens.

GALLEON, in naval affairs, a ſort of ſhips employed in the commerce of the Weſt Indies. The Spaniards ſend annually two fleets; the one for Mexico, which they call the *flota*; and the other for Peru, which they call the *galleons*. See FLOTA.

By a general regulation made in Spain, it has been eſtabliſhed, that there ſhould be twelve men of war and five tenders annually fitted out for the armada or galleons; eight ſhips of 600 tons burden each, and three tenders, one of 100 tons, for the iſland Margarita, and two of 80 each, to follow the armada; for the New Spain fleet, two ſhips of 600 tons each, and two tenders of 80 each; and for the Honduras fleet, two ſhips of 500 tons each: and in caſe no fleet happened to ſail any years, three galleons and a tender ſhould be ſent to New Spain for the plate.

They are appointed to ſail from Cadiz in January, that they may arrive at Porto Bello about the middle of April; where, the fair being over, they may take aboard the plate, and be at Havannah with it about the middle of June, where they are joined by the flota, that they may return to Spain with the greater ſafety.

GALLEOT, a ſmall galley deſigned only for chace, carrying but one maſt and two pattereroes: it can both ſail and row, and has 16 or 20 oars. All the ſeamen on board are ſoldiers, and each has a muſket by him on quitting his oar.

GALLERY, in architecture, a covered place in a houſe, much higher than broad, and uſually in the wings of a building; its uſe being chiefly to walk in.

GALLERIES, in gardening, are certain ornaments made with trees of different kinds; which are very common in all the French gardens, but are ſeldom introduced into the Britiſh ones, eſpecially ſince the taſte for clipped trees has been exploded. For thoſe however, who may ſtill chooſe to have them, Mr Miller gives the following directions.

In order to make a gallery in a garden with porticoes and arches, a line muſt firſt be drawn of the length you deſign the gallery to be; which being done, it is to be planted with hornbeam, as the foundation of the gallery. The management of galleries is not difficult. They require only to be digged round about; and ſheared a little when there is occaſion. The chief curioſity required is in the ordering the forepart of the gallery, and in forming the arches. Each pillar of the porticoes or arches ought to be four feet diſtant from another, and the gallery 12 feet high and 10 feet wide, that there may be room for two or three perſons to walk abreaſt. When the hornbeams are grown to the height of three feet, the diſtance of the pillars well regulated, and the ground-work of the gallery finiſhed, the next thing to be done is to form the frontiſpiece; to perform which, you muſt ſtop the hornbeam between two pillars for that purpoſe, which forms the arch. As it grows, you muſt with your ſheers cut off thoſe boughs which outſhoot the others. In time they will grow ſtrong, and may be kept in form by the ſheers. Portico-galleries may be covered with lime-trees.

GALLERY, in fortification, a covered walk acroſs the ditch of a town, made of ſtrong beams covered over with planks, and loaded with earth: ſometimes it is covered with raw hides, to defend it from artificial fires of the beſieged.

GALLERY of a Mine, is a narrow paſſage or branch of a mine carried on under ground to a work deſigned to be blown up. See MINE.

GALLERY, in a ſhip, that beautiful frame, which is made in the form of a balcony, at the ſtern of a ſhip without board; into which there is a paſſage out of the admiral's or captain's cabbin, and is for the ornament of the ſhip.

GALLEY, a kind of low flat-built veſſel, furniſhed with one deck, and navigated with ſails and oars, particularly in the Mediterranean. By the Greek authors under the eaſtern empire, this kind of veſſel was called γωλαια and γαλεια: and by the Latin authors of the ſame time, *galea*; whence, according to ſome, the modern denomination. Some ſay it was called *galea*, on account of a caſk or helmet which it carried on its prow, as Ovid atteſts, *de Triſtib.* The French call it *galere*; by reaſon, they ſay, that the top of the maſt is uſually cut in the form of a hat, which the Italians call *galero*. Others derive both *galea*, and *galere*, from a fiſh by the Greeks called γαλεωτης, or ξιφιας, and by us the *ſword-fiſh*, which this veſſel reſembles. Laſtly, others derive the *galley*, *galea*, *galere*, *galeaſſe*, &c. from the Syriac and Chaldee *gaul*, and *gallin*, a man expoſed on the water in a veſſel of wood.

The largeſt ſort of theſe veſſels is employed only by the Venetians. They are commonly 162 feet long above, and 133 feet by the keel; 32 feet wide, with 23 feet length of ſtern-poſt. They are furniſhed with three maſts, and 32 banks of oars; every bank containing two oars, and every oar being managed by ſix or ſeven ſlaves, who are uſually chained thereto. In the fore-part they have three little batteries of cannon, of which the loweſt is of two 36 pounders, the ſecond of two 24 pounders, and the uppermoſt of two 2 pounders: three 18 pounders are alſo planted on each quarter. The complement of men for one of theſe galleys is 1000 or 1200. They are eſteemed extremely convenient for bombarding or making a deſcent upon an enemy's coaſt, as drawing but little water; and having by their oars frequently the advantage of a ſhip of war, in light winds or calms, by cannonading the latter near the ſurface of the water; by ſcouring her whole length with their ſhot, and at the ſame time keeping on her quarter or bow, ſo as to be out of the direction of her cannon.

The galleys next in ſize to theſe, which are alſo called *half-galleys*, are from 120 to 130 feet long, 18 feet broad, and 9 or 10 feet deep. They have two maſts, which may be ſtruck at pleaſure; and are furniſhed with two large lateen ſails, and five pieces of cannon. They have commonly 25 banks of oars, as deſcribed above. A ſize ſtill leſs than theſe are called *quarter-galleys*, carrying from 12 to 16 banks of oars. There are very few galleys now beſides theſe in the Mediterranean, which are found by experience to be of little utility except in fine weather; a circumſtance which renders their ſervice extremely precarious. They generally keep cloſe under the ſhore, but ſometimes venture out to ſea to perform a ſummer cruiſe.

GALLEY-Worm, in zoology. See IULUS.

GALLI, in antiquity, a name given to the prieſts of Cybele, from the river Gallus in Phrygia; but of the etymology of the name we have no certain account. All that we learn with certainty about them is, that they were eunuchs and Phrygians, and that in their ſolemn proceſſions they danced, bawled, drummed, cut and ſlaſhed themſelves, playing upon timbrels, pipes, cymbals, &c. and driving about an aſs loaded with the ſacred rites and trumpery of their goddeſs. When a young man was to be initiated, he was to throw off his cloaths, run crying aloud into the midſt of their troop, and there draw a ſword and caſtrate himſelf; after this he was to run into the ſtreet with the parts cut off, in his hand, throw them into ſome houſe, and in the ſame houſe put on a woman's dreſs.

Theſe prieſts had the names alſo of *Curetes*, *Corybantes*, and *Dactyli*. The chief prieſt was called *Archi-Gallus*. This order of prieſthood is found both amongſt Greeks and Romans. See an account of them in *Lucret.* lib. ii. and *Juv.* ſat. vi.

GALLI, the *Gauls*. See GALLIA and GAULS.

GALLI, five ſmall deſolate iſlands on the coaſt of the Principato Citra of Naples. They are ſuppoſed to be the Syrenuſæ, or iſlands once inhabited by the Sirens, which Ulyſſes paſſed with ſo much caution and hazard. Great revolutions, however, have been occaſioned in their ſhape, ſize, and number, by the effects of ſubterranean fire; and ſome learned perſons go ſo far as to aſſert, that theſe rocks have riſen from the bottom of the ſea ſince Homer ſang his rhapſodies; conſequently, that thoſe monſters dwelt on ſome other ſpot, probably Sicily or Capri. The tradition of Sirens reſiding hereabouts is very ancient and univerſally admitted; but what they really were, diveſted of their fabulous and poetical diſguiſe, it is not eaſy to diſcover. See SIREN.

The Sirenuſæ were only three in number; and therefore if theſe and the Galli be the ſame, two more muſt have ſince riſen, or the three have been ſplit into five by a ſubterraneous convulſion. On the largeſt is a watch-tower, and the next has a deſerted hermitage. The principal iſland is only a narrow ſemicircular ridge covered with a ſhallow coat of ſoil; two other little iſlands and ſome jagged rocks juſt peeping above the waves, correſpond with this one ſo as to trace the outline of a volcanical crater. The compoſition of them all is at top a calcareous rock extremely ſhaken, tumbled, and confuſed, mixed with maſſes of breccia, diſpoſed in a moſt irregular manner; below theſe is lava, and the deeper the eye follows it the ſtronger are the marks of fire: below the ſurface of the water, and in ſome places above it, the layers are complete blocks of baſaltes. Hence it is fair to preſume, that central fires have heaved up to light the torrified ſubſtances that originally lay near their focus, with all the intermediate ſtrata that covered them from the ſea. The layers incline downwards from eaſt to weſt; the air ſeems to have forced its way into part of the maſs while in fuſion, and by checking its workings cauſed many large caverns to be left in it. Theſe iſlands are uncultivated and uninhabited ſince the old hermit of St Antonio died. Myrtle covers moſt of the ſurface.

GALLIA, a large country of Europe, called *Gallatia* by the Greeks. The inhabitants were called *Galli*, *Celtæ*, *Celtiberi*, and *Celtoſcythæ*. Ancient Gaul was divided into four different parts by the Romans, called *Gallia Belgica*, *Narbonenſis*, *Aquitania*, and *Celtica*. Gallia Belgica was the largeſt province, bounded by Germany, Gallia Narbonenſis, and the German ocean; and contained the modern country of Alſace, Lorraine, Picardy, with part of the low countries, and of Champagne, and of the iſle of France. Gallia Narbonenſis, which contained the provinces now called *Languedoc*, *Provence*, *Dauphiné*, *Savoy*, was bounded by the Alps and Pyrenean mountains, by Aquitania Belgicum, and the Mediterranean. Aquitania Gallia, now called the *provinces of Pottou*, *Santonge*, *Guienne*, *Berry*, *Limoſin*, *Gaſcogny*, *Auvergne*, &c. was ſituated between the Garumna, the Pyrenean mountains, and the ocean. Gallia Celtica, or Lugdunenſis, was bounded by Belgium, Gallia Narbonenſis, the Alps, and the ocean. It contained the country at preſent known by the name of *Lyonnois*, *Touraine*, *Franche Comté*, *Senenois*, *Switzerland*, and part of *Normandy*. Beſides theſe grand diviſions, there is often mention made of Gallia Ciſalpina or Citerior, Tranſalpina or Ulterior, which refers to that part of Italy which was conquered by ſome of the Gauls who croſſed the Alps. By Gallia Ciſalpina, the Romans underſtood that part of Gaul which lies in Italy, and by Tranſalpina, that which lies beyond the Alps, in regard only to the inhabitants of Rome. Gallia Ciſpadana, and Tranſpadana, is applied to a part of Italy conquered by ſome of the Gauls; and then it means the country on this ſide of the Po, or beyond the Po, with reſpect to Rome. By Gallia Togata, the Romans underſtood Ciſalpine Gaul, where the Roman gowns *togæ* were uſually worn. Gallia Narbonenſis was called *Braccata*, on account of the peculiar covering of the inhabitants for their thighs. The epithet of *Comata* is applied to Gallia Celtica, becauſe the people ſuffered their hair to grow to an uncommon length. The inhabitants were great warriors, and their valour overcame the Roman armies, took the city of Rome, and invaded Greece in different ages. They ſpread themſelves over the greateſt part of the world. They were very ſuperſtitious in their religious ceremonies, and revered the ſacerdotal order as if they had been gods. They long maintained a bloody war againſt the Romans, and Cæſar reſided 10 years in their country before he could totally ſubdue them. See Gaul.

GALLIARD, or Gagliarda, a ſort of dance anciently in great requeſt; conſiſting of very different motions and actions, ſometimes proceeding *terra à terra* or ſmoothly along; ſometimes capering; ſometimes along the room, and ſometimes acroſs. The word is French, *gailliarde*, or rather Italian; and literally ſignifies "gay, merry, ſprightly." This dance was alſo called *Romaneſque*, becauſe brought from Rome.

Thoinot Arbeau, in his Orcheſography, deſcribes it as conſiſting of five ſteps, and five poſitions of the feet, which the dancers performed before each other, and whereof he gives us the ſcore or tablature, which is of ſix minims, and two triple times.

GALLIARDA, in the Italian muſic, the name of a tune that belongs to a dance called a *galliard*. The air of it is lively in triple time.

GALLICAN, any thing belonging to France: thus the term *Gallican church* denotes the church of France, or the aſſembly of the clergy of that kingdom.

GALLICISM, a mode of ſpeech peculiar to the French language, and contrary to the rules of grammar in other languages. With us it is uſed to denote ſuch phraſes or modes of ſpeech in Engliſh as are formed after the French idiom.

GALLINACEUS lapis, a gloſſy ſubſtance produced by volcanic fires; the ſame with the *lapis obſidianus* of the ancients. A kind of it is brought from Paris, of a beautiful black, reſembling the colour of a large crow in that country named *gallinaço*.

GALLINÆ, in ornithology, an order of birds. See Ornithology.

GALLINACIOUS, an appellation given to the birds of the order of the gallinæ.

GALLING, or Excoriation, in medicine. See Excoriation.

Galling of a Horſe's Back, a diſorder occaſioned by heat, and the chafing or pinching of the ſaddle.

In order to prevent it, ſome take a hind's ſkin well garniſhed with hair, and fit it neatly under the pannel of the ſaddle, ſo that the hairy ſide may be next the horſe.

When a horſe's back is galled upon a journey, take out a little of the ſtuffing of the pannel over the ſwelling, and ſew a piece of ſoft white leather on the inſide of the pannel: anoint the part with ſalt butter, and every evening wipe it clean, rubbing it till it grow ſoft, anointing it again with butter, or, for want of that, with greaſe: waſh the ſwelling, or hurt, every evening with cold water and ſoap; and ſtrew it with ſalt, which ſhould be left on till the horſe be ſaddled in the morning.

GALLINULE. See Fulica.

GALLIPOLI, a ſea-port town of Italy, in the kingdom of Naples, and in the Terra-di-Otranto, with a biſhop's ſee. It ſtands on a rocky iſland, joined to the continent by a bridge. From the remoteſt antiquity this was a ſtation ſo favourable to commerce, that every maritime power wiſhed to ſecure it; and it is a reproach to government, that nothing has been done to improve its natural advantages: at preſent, Mr Swinburn informs us, it has neither harbour nor ſhelter for ſhipping. Charles II. demoliſhed Gallipoli for its adherence to Frederick of Aragon. The Venetians treated it with great cruelty in the 15th century; and in 1481 it was pillaged by the Turks. To preſerve it from future calamities, Charles V. repaired and ſtrengthened its fortifications; and, ſince that period, it has enjoyed the benefits of peace and trade, which have rendered it the moſt opulent and gayeſt town upon the coaſt, though its inhabitants do not exceed 6000 in number. Conſumptions and ſpitting of blood are rather frequent here, occaſioned by the great ſubtilty of the air, which is ventilated from every quarter. The buildings are tolerable, and ſome of the churches have good paintings. The cotton trade brings in about 30,000 ducats a-year. Good muſlins, cotton ſtockings, and other parts of apparel, are manufactured here, and purchaſed by the Provençals;

ças; for Gallipoli has no direct trade with the metropolis. Silk and Saffron were formerly objects of traffic; but heavy duties and oppreſſion have cauſed them to be abandoned. The wine of this territory is good; but from dryneſs of climate, and ſhallowneſs of ſoil, the vintage frequently fails in quantity; and then the Gallipolitans have recourſe to Sicily for a ſupply. Oil is the great ſupport of the place: two-thirds of the produce of its olive plantations are exported to France, and the north of Italy; the remainder is ſent to Naples, and other ports of the kingdom. Neapolitan merchants, by means of agents ſettled at Gallipoli, buy up the oils, from year to year, long before an olive appears upon the tree; and the price is afterwards ſettled by public authority. The Neapolitans ſell their oil to the merchants of Leghorn; and, if faithfully ſerved by their factors in Terra di Otranto, ought to double their capital in two years. But, to balance this advantage, they run great riſks, pay exorbitant intereſt, and have frequent bankruptcies to guard againſt. E. Long. 18. 10. N. Lat. 40. 20.

Gallipoli, a ſea-port town of Turkey in Europe, in the province of Romania, ſeated at the mouth of the ſea of Marmora, with a good harbour, and a biſhop's ſee. It contains about 10,000 Turks, 3500 Greeks, beſides a great number of Jews. The bazar or bezeſtein, the place where merchandizes are ſold, is a handſome ſtructure, with domes covered with lead. It is an open place, and has no other defence than a paltry ſquare caſtle. The houſes of the Greeks and Jews have doors not above three feet and an half high, to prevent the Turks riding into their houſes. E. Long. 26. 59. N. Lat. 40. 30.

GALLIUM, in botany. See Galium.

GALLO, an iſland of the South Sea, near the ſea-coaſt of Peru, in South America, which was the firſt place poſſeſſed by the Spaniards when they attempted the conqueſt of Peru; it is alſo the place where the bucaneers uſed to come for wood and water, and to refit their veſſels when they were in theſe parts. W. Long. 88. 0. N. Lat. 2. 30.

Gallo-græcia, a county of Aſia minor, near Bithynia and Cappadocia. It was inhabited by a colony of Gauls, who aſſumed the name of *Gallogræci*, becauſe a number of Greeks had accompanied them in their emigration. See Gallatia.

GALLOIS (John), born at Paris in 1632, was an univerſal ſcholar; but chiefly noted for having been, in conjunction with M. de Sallo who formed the plan, the firſt publiſher of the *Journal des Sçavans*. The firſt journal was publiſhed January 5th 1665; but theſe gentlemen criticiſed new works ſo rigorouſly, that the whole tribe of authors united and cried it down. De-Sallo declined entirely after the publication of the third number: but Gallois ventured to ſend out a fourth, on January 4th 1666; though not without a moſt humble advertiſement at the beginning, wherein it was declared, that the author "would not preſume to criticiſe, but ſimply give an account of the books." This, with the protection of M. Colbert, who was greatly taken with the work, gradually reconciled the public to it: and thus began literary journals, which have been continued from that time to this, under various titles, and by various writers. Gallois continued his journal to the year 1674, when more important occupations obliged him to turn it over to other hands. M. Colbert had taken him into his houſe to teach him Latin; and when he loſt his patron in 1683, he was firſt made librarian to the king, and then Greek profeſſor in the royal college. He died in 1707.

GALLON, a meaſure of capacity both for dry and liquid things, containing four quarts. But theſe quarts, and conſequently the gallon itſelf, are different, according to the quality of the thing meaſured: For inſtance, the wine-gallon contains 231 cubic inches, and holds eight pounds averdupois of pure water; the beer and ale-gallon contains 281 ſolid inches, and holds ten pounds three ounces and a quarter averdupois of water; and the gallon for corn, meal, &c. $272\frac{1}{4}$ cubic inches, and holds nine pounds thirteen ounces of pure water.

GALLOP, in the manege, is the ſwifteſt natural pace of a horſe, performed by reaches or leaps; the two fore-feet being raiſed almoſt at the ſame time; and when theſe are in the air, and juſt ready to touch the ground again, the two hind-feet are lifted almoſt at once. The word is borrowed from the barbarous Latin *calupare*, or *calpare*, "to run." Some derive it from *caballicare*; others from the Greek καλπαζειν, or καλπαν, *to ſpur a horſe.*

Galloper, in Artillery, is the name of a carriage which ſerves for a pound and a half gun. This carriage has ſhafts ſo as to be drawn without a limbon, and is thought by ſome to be more convenient and preferable to other field carriages; it may likewiſe ſerve for light three and ſix pounders.

GALLOWAY, a county of Scotland, which gives the title of earl to a branch of the noble family of Stuart. It is divided into two diſtricts; the weſtern, called *Upper Galloway*, being the ſame with Wigtonſhire; and the eaſtern, or ſtewartry of Kircudbright, called *Lower Galloway*. See Kircudbright and Wigtonshire.

Mull of Galloway, the South Cape or promontory of all Scotland in the county of Galloway on the Iriſh Sea.

Galloways is the name of a peculiar ſort of horſes, ſo called from the county of Galloway in Scotland, where they are bred. Tradition reports that this kind of horſes ſprung from ſome Spaniſh ſtallions, which ſwam on ſhore from ſome of the ſhips of the famous Spaniſh armada, wrecked on the coaſt; and coupling with the mares of the country, furniſhed the kingdom with their poſterity. They were much eſteemed, and of a middling ſize, ſtrong, active, nervous, and hardy.

GALLOWS, an inſtrument of puniſhment, whereon perſons convicted capitally of felony, &c. are executed by hanging.

Among our anceſtors it was called *furca*, "fork;" a name by which it is ſtill denominated abroad, particularly in France and Italy, in this latter country, the the reaſon of the name ſtill ſubſiſts; the gallows being a real fork drove into the ground, acroſs the legs whereof is laid a beam, to which the rope is tied. See Furca.

GALLUS (Cornelius), an ancient Roman poet, born at Forum Julium, now called *Frejus*, in France. He was a particular favourite with Auguſtus Cæſar, who made him governor of Egypt: but his maladminiſtration there occaſioned his baniſhment, and the loſs of his eſtate; for grief of which he put an end to his own life. He wrote four books of love-elegies; and Virgil has complimented him in many places.

GALLUS, or COCK, in ornithology. See PHASIANUS.

GALLY, in printing, a frame into which the compoſitor empties the lines out of his compoſing-ſtick, and in which he ties up the page when it is completed.

The gally is formed of an oblong ſquare board, with a ledge on three ſides, and a groove to admit a falſe bottom, called a *gally-ſlice*.

GALWAY, or GALLOWAY, a county of Ireland, which is 82 miles in length; and 42 in breadth, bounded by the counties of Clare, Tipperary, King's County, Roſcommon, and the ſea. The river Shannon waſhes the frontiers of the eaſt and ſouth-eaſt, and forms a lake ſeveral miles in length. There is another great lake called *Corbis*, or *Carib*, which is near 20 miles long, and five broad. The county contains 15,420 houſes, 136 pariſhes, 17 baronies, and 13 boroughs; and ſends 8 members to parliament. The capital town is of the ſame name.

GALWAY, a town of Ireland, in the county of the ſame name, and province of Connaught, of which it is the capital. It is ſeated on the bay of Galway on the weſtern ocean, 108 miles weſt of Dublin, and gives title of Viſcount to the family of Monkton. It is ſurrounded with ſtrong walls, has large ſtraight ſtreets, and the houſes are generally well built with ſtone. It has a good trade into foreign parts, on account of its harbour, which is defended by a fort. It is governed by a mayor, ſheriffs, and recorder, and returns two members to parliament. It has but one pariſh church, which is a large and beautiful Gothic ſtructure; an exchange; barracks for 10 companies of foot, a charter-ſchool, and an hoſpital. This was one of the ſtrongeſt towns in the kingdom: it held out ſome time againſt General Ginkle, who inveſted and took it after the battle of Aughrim. Its fortifications were then repaired; the walls are flanked by baſtions, but are moſtly gone to decay. The ſalmon and herring fiſheries are carried on here with great ſpirit, and employ 700 boats, the quantity of kelp manufactured and exported is conſiderable; and the growth of the linen manufacture, though of late introduction, is become very important. In 1296, Sir William de Burgh founded a monaſtery here for Franciſcan friars, on St Stephen's iſland, ſituated without the north gate of the town. In 1381, there being two popes at Rome, and the people of Ireland being doubtful to which they ſhould pay obedience, pope Urban, to fix them entirely to his intereſt, empowered the guardian of this monaſtery to excommunicate every perſon in the province of Connaught who ſhould adhere to Clement VII. who he aſſured them was antipope. The tomb of the founder of this monaſtery was diſcovered in June 1779, upwards of four feet under ground, with his family-arms, and a very long broad ſword, elegantly carved thereon; ſome of the remains are ſtill to be ſeen.—Near the weſt gate of the town, without the walls, was the monaſtery of St Mary of the hill: on the nuns forſaking it, the ſecular clergy entered into and kept poſſeſſion of it for a conſiderable time; but on the petition of the inhabitants of the town, to pope Innocent VIII. it was granted to the Dominican friars, by a bull dated the 4th December 1488; there are no remains of this foundation except the cemetery; the whole building having been demoliſhed by the townſmen in the year 1652, in order to prevent Cromwell from turning it into a fortification againſt themſelves: there was alſo an Auguſtinian friary, on a hill near this town, founded by Stephen Lynch, and Margaret his wife, in the year 1508, at the earneſt ſolicitation of Richard Nangle, a friar of the ſame order, who afterwards became archbiſhop of Tuam.

GAMA (Vaſco de), a Portugueſe admiral, celebrated for his diſcovery of the Eaſt Indies by the Cape of Good Hope, was born at Synes; and, in 1497, was ſent to the Indies by king Emanuel: he returned in 1502, and ſailed thither again with 13 veſſels richly laden. He was made vicery of the Indies by king John III; and died at Cochin, on the 24th of December 1525. Don Stephen and Don Chriſtopher de Gama, his ſons, were alſo viceroys of the Indies, and celebrated in hiſtory.

GAMBIA, a large river of Negroland in Africa, generally ſuppoſed to be a branch of the Niger. See NILE, NIGER, and SENEGAL.

GAMBOGE, is a concreted vegetable juice *, partly of a gummy and partly of a reſinous nature. It is chiefly brought to us in large cakes or rolls from Cambaja in the Eaſt Indies. The beſt ſort is of a deep yellow or orange colour, breaks ſhining and free from droſs: it has no ſmell, and very little taſte, unleſs kept in the mouth for ſome time, when it impreſſes a ſlight ſenſe of acrimony. It immediately communicates to ſpirit of wine a bright golden colour, and almoſt entirely diſſolves in it; Geoffroy ſays, except the ſixth part. Alkaline ſalts enable water to act upon this ſubſtance powerfully as a menſtruum: the ſolution made by their means is ſomewhat tranſparent, of a deep blood red colour, and paſſes the filtre: the dulcified ſpirit of ſal ammoniac readily and entirely diſſolves it, and takes up a conſiderable quantity; and what is pretty remarkable, this ſolution mixes either with water or ſpirit without growing turbid.

As a pigment it makes a beautiful yellow, which is much uſed by the painters. Dr Lewis ſays, that it makes a beautiful and durable citron yellow ſtain upon marble, whether rubbed in ſubſtance on the hot ſtone, or applied as dragon's blood ſometimes is, in form of a ſpirituous tincture. When it is applied on cold marble, the ſtone is afterwards to be heated, to make the colour penetrate.

As a medicine, gamboge evacuates powerfully both upwards and downwards; ſome condemn it as acting with too great violence, and occaſioning dangerous hypercatharſes; whilſt others are of a contrary opinion. Geoffroy ſeems particularly fond of this medicine, and informs us, that he has frequently given from two to four grains, without its proving at all emetic;

* See *Gambogia*.

emetic; that from four to eight grains, it both vomits and purges, without violence; that its operation is ſoon over; and that if given in a liquid form, and ſufficiently diluted, it ſtands not in need of any corrector; that in the form of a bolus or pill, it is moſt apt to prove emetic, but very rarely has this effect if joined along with *mercurius dulcis*. He nevertheleſs cautions againſt its uſe where the patient cannot eaſily bear vomiting.—It has been uſed in dropſy with cream of tartar or jalap, or both, to quicken their operation. It is alſo recommended by ſome to the extent of 15 grains with an equal quantity of vegetable alkali in caſes of the tape-worm. This doſe is ordered in the morning; and if the worm is not expelled in two or three hours, it is repeated even to the third time with ſafety and efficacy. It is aſſerted that it has been given to this extent even in delicate habits. This is ſaid to be the remedy alluded to by Baron Van Swieten, which was employed by Dr Herenſchward, and with him proved ſo ſucceſsful in the removal of the tænia lata.

GAME, in general, ſignifies any diverſion or ſport, that is performed with regularity, and reſtrained to certain rules. See GAMING.

Games are uſually diſtinguiſhed into thoſe of exerciſe and addreſs, and thoſe of hazard. To the firſt belong cheſs, tennis, billiards, &c. and to the latter thoſe performed with cards or dice, as back-gammon, ombre, picquet, whiſt, &c. See *BACK-Gammon*, &c.

GAMES, in antiquity, were public diverſions, exhibited on ſolemn occaſions. Such among the Greeks, were the Olympic, Pythian, Iſthmian, Nemean, &c. games; and, among the Romans, the Apollinarian, Circenſian, Capitoline, &c. games. See OLYMPIC, PYTHIAN, FUNERAL, &c.

GAME, in law, ſignifies birds, or prey, taken or killed by fowling or hunting.

The property of ſuch animals *feræ naturæ* as are known under the denomination of *game*, with the right of purſuing, taking, and deſtrying them, in Britain, is veſted in the king alone, and from him derived to ſuch of his ſubjects as have received the grants of a chaſe, a park, or a free warren.

Blackſt. Comment.

By the law of nature, indeed, every man, from the prince to the peaſant, has an equal right of purſuing, and taking to his own uſe, all ſuch creatures as are *feræ naturæ*, and therefore the property of nobody, but liable to be ſeized by the firſt occupant. But it follows from the very end and conſtitution of ſociety, that this natural right, as well as many others belonging to man as an individual, may be reſtrained by poſitive laws enacted for reaſons of ſtate, or for the ſuppoſed benefit of the community. This reſtriction may be either with reſpect to the *place* in which this right may, or may not, be exerciſed; with reſpect to the *animals* that are the ſubjects of this right; or with reſpect to the *perſons* allowed or forbidden to exerciſe it. And, in conſequence of this authority, we find that the municipal laws of many nations have exerted ſuch power of reſtraint; have in general forbidden the entering on another man's grounds, for any cauſe, without the owner's leave; have extended their protection to ſuch particular animals as are uſually the objects of purſuit; and have inveſted the prerogative of hunting and taking ſuch animals, in the ſovereign of the ſtate only, and ſuch as he ſhall authorize. Many reaſons have concurred for making theſe conſtitutions; as, 1. For the encouragement of agriculture and improvement of lands, by giving every man an excluſive dominion over his own ſoil. 2. For the preſervation of the ſeveral ſpecies of theſe animals, which would ſoon be extirpated by a general liberty. 3. For prevention of idleneſs and diſſipation in huſbandmen, artificers, and others of lower rank; which would be the unavoidable conſequence of univerſal licence. 4. For prevention of popular inſurrections and reſiſtance to the government, by diſarming the bulk of the people: which laſt is a reaſon oftener meant than avowed, by the makers of foreſt or game laws. Nor, certainly, in theſe prohibitions is there any *natural* injuſtice, as ſome have weakly enough ſuppoſed: ſince, as Puffendorf obſerves, the law does not hereby take from any man his preſent property, or what was already his own; but barely abridges him of one means of acquiring a future property, that of occupancy, which indeed the law of nature would allow him, but of which the laws of ſociety have in moſt inſtances very juſtly and reaſonably deprived him.

Yet, however defenſible theſe proviſions in general may be, on the footing of reaſon, or juſtice, or civil policy, we muſt, notwithſtanding acknowledge, that, in their preſent ſhape they owe their immediate original to ſlavery. It is not till after the irruption of the northern nations into the Roman empire, that we read of any other prohibitions, than that natural one of not ſporting on any private grounds without the owner's leave.

With regard to the riſe and original of the preſent civil prohibitions, in England, it will be found, that all foreſt and game laws were introduced into Europe at the ſame time, and by the ſame policy, as gave birth to the feodal ſyſtem; when thoſe ſwarms of barbarians iſſued from their northern hive, and laid the foundation of moſt of the preſent kingdoms of Europe, on the ruins of the weſtern empire. For when a conquering general came to ſettle the economy of a vanquiſhed country, and to part it out among his ſoldiers or feudatories, who were to render him military ſervice for ſuch donations; it behoved him, in order to ſecure his new acquiſitions, to keep the *ruſtici* or natives of the country, and all who were not his military tenants, in as low a conditon as poſſible, and eſpecially to prohibit them the uſe of arms. Nothing could do this more effectually than a prohibition of hunting and ſporting: and therefore it was the policy of the conqueror to reſerve this right to himſelf, and ſuch on whom he ſhould beſtow it; which were only his capital feudatories, or greater barons. And, accordingly, we find, in the feudal conſtitutions, one and the ſame law prohibiting the *ruſtici* in general from carrying arms, and alſo proſcribing the uſe of nets, ſnares, or other engines for deſtroying the game. This excluſive privilege well ſuited the martial genius of the conquering troops, who delighted in a ſport which in its purſuit and ſlaughter bore ſome reſemblance to war. *Vita omnis* (ſays Cæſar, ſpeaking of the ancient Germans) *in venationibus atque in ſtudiis rei militaris conſiſtit.* And Tacitus in like manner obſerves, that *quoties bella non ineunt,*

ineunt, multum venatibus, plus per otium tranſigunt. And indeed, like ſome of their modern ſucceſſors, they had no other amuſement to entertain their vacant hours; they deſpiſing all arts as effeminate, and having no other learning, than was couched in ſuch rude ditties as were ſung at the ſolemn carouſals which ſucceeded theſe ancient huntings. And it is remarkable, that, in thoſe nations where the feodal policy remains the moſt uncorrupted, the foreſt or game laws continue in their higheſt rigour. In France, all game is properly the king's; and in ſome parts of Germany it is death for a peaſant to be found hunting in the woods of the nobility.

In Britain, alſo, hunting has ever been eſteemed a moſt princely diverſion and exerciſe. The whole iſland was repleniſhed with all ſorts of game in the times of the Britons; who lived in a wild and paſtoral manner, without incloſing or improving their grounds; and derived much of their ſubſiſtence from the chaſe, which they all enjoyed in common. But when huſbandry took place under the Saxon government, and lands began to be cultivated, improved, and incloſed, the beaſts naturally fled into the woody and deſart tracts, which were called the *foreſts*; and, having never been diſpoſed of in the firſt diſtribution of lands, were therefore held to belong to the crown. Theſe were filled with great plenty of game, which the royal ſportſmen reſerved for their own diverſion, on pain of a pecuniary forfeiture for ſuch as interfered with their ſovereign. But every freeholder had the full liberty of ſporting upon his territories, provided he abſtained from the king's foreſts.

However, upon the Norman conqueſt, a new doctrine took place; and the right of purſuing and taking all beaſts of chaſe or *venary*, and ſuch other animals as were accounted *game*, was then held to belong to the king, or to ſuch only as were authoriſed under him. And this, as well upon the principles of the feodal law, that the king is the ultimate proprietor of all the lands in the kingdom, they being all held of him as the chief lord, or lord paramount of the fee; and that therefore he has the right of the univerſal ſoil, to enter thereon, and to chaſe and take ſuch creatures at his pleaſure: as alſo upon another maxim of the common law, that theſe animals are *bona vacantia*, and, having no other owner, belong to the king by his prerogative. As therefore the former reaſon was held to veſt in the king a *right* to purſue and take them any where; the latter was ſuppoſed to give the king, and ſuch as he ſhould authorize, a *ſole* and *excluſive* right.

This right, thus newly veſted in the crown, was exerted with the utmoſt rigour, at and after the time of the Norman eſtabliſhment; not only in the ancient foreſts, but in the new ones which the conqueror made, by laying together vaſts tracts of country, depopulated for that purpoſe, and reſerved ſolely for the king's royal diverſion; in which were exerciſed the moſt horrid tyrannies and oppreſſions, under colour of foreſt-law, for the ſake of preſerving the beaſts of chaſe; to kill any of which, within the limits of the foreſt, was as penal as the death of a man. And, in purſuance of the ſame principle, king John laid a total interdict upon the *winged* as well as the *fourfooted* creation: *capturam avium per totam Angliam interdixit**. The cruel and unſupportable hardſhips which theſe foreſt-laws created to the ſubject, occaſioned our anceſtors to be as zealous for their reformation, as for the relaxation of the feodal rigours and the other exactions introduced by the Norman family; and accordingly we find the immunities of *carta de foreſta* as warmly contended for, and extorted from the king with as much difficulty, as thoſe of *magna carta* itſelf. By this charter, confirmed in parliament†, many foreſts were diſafforeſted, or ſtripped off their oppreſſive privileges, and regulations were made in the regimen of ſuch as remained; particularly killing the king's deer was made no longer a capital offence, but only puniſhed by a fine, impriſonment, or abjuration of the realm. And by a variety of ſubſequent ſtatutes, together with the long acquieſcence of the crown without exerting the foreſt-laws, this prerogative is now become no longer a grievance to the ſubject.

But as the king reſerved to himſelf the *foreſts* for his own excluſive diverſion, ſo he granted out from time to time other tracts of lands to his ſubjects under the names of *chaſes* or *parks*; or gave them licence to make ſuch in their own grounds; which indeed are ſmaller foreſts in the hands of a ſubject, but not governed by the foreſt-laws; and by the common law no perſon is at liberty to take or kill any beaſts of chaſe, but ſuch as hath an ancient chaſe or park; unleſs they be alſo beaſts of prey.

As to all inferior ſpecies of game, called *beaſts and fowls of warren*; the liberty of taking or killing them is another franchiſe or royalty, derived likewiſe from the crown, and called *free-warren*; a word which ſignifies preſervation or cuſtody: as the excluſive liberty of taking and killing fiſh in a public ſtream or river is called a *free-fiſhery*; of which, however, no new franchiſe can at preſent be granted, by the expreſs proviſion of *magna carta*, c. 16. The principal intention of granting a man theſe franchiſes or liberties was in order to protect the game, by giving him a ſole and excluſive power of killing it himſelf, provided he prevented other perſons. And no man but he who has a chaſe or free-warren, by grant from the crown, or preſcription, which ſuppoſes one, can juſtify hunting or ſporting upon another man's ſoil; nor indeed, in thorough ſtrictneſs of common law, either hunting or ſporting at all.

However novel this doctrine may ſeem, it is a regular conſequence from what has been before delivered, that the ſole right of taking and deſtroying game belongs excluſively to the king. This appears, as well from the hiſtorical deduction here made, as becauſe he may grant to his ſubjects an excluſive right of taking them; which he could not do, unleſs ſuch a right was firſt inherent in himſelf. And hence it will follow, that no perſon whatever, but he who has ſuch derivative right from the crown, is by common law intitled to take or kill any beaſts of chaſe, or other game whatſoever. It is true, that, by the acquieſcence of the crown, the frequent grants of free-warren in ancient times, and the introduction of new penalties of late by certain ſtatutes for preſerving the game, this excluſive prerogative of the king is little known or conſidered; every man that is exempted from thoſe modern penalties, looking upon himſelf as at liberty to do what he pleaſes with the game: whereas the contrary is ſtrictly true, that no man, however well *qualified* he may vulgarly be eſteemed, has a right to encroach on the royal prerogative by the killing of game, unleſs he can ſhow a particular grant of free-warren: or a preſcription, which preſumes a grant; or ſome authority under an act of parliament. As for the latter, there are but two inſtances wherein an expreſs permiſſion to kill game was ever given by ſtatute; the one by 1 Jac. I. *c.* 27. altered by 7 Jac. I. *c.* 11. and virtually repealed by 22 and 23 Car. II. *c.* 25. which gave authority, ſo long as they remained in force, to the owners of free-warren, to lords of manors, and to all freeholders having 40l. *per annum* in lands of inheritance, or 80l. for life or lives, or 400l. perſonal eſtate (and their ſervants), to take partridges and pheaſants upon their own, or their maſter's free-warren, inheritance, or freehold: the other by 5 Ann. *c.* 14. which empowers lords and ladies of manors to appoint gamekeepers, to kill game for the uſe of ſuch lord or lady; which with ſome alteration ſtill ſubſiſts, and plainly ſuppoſes ſuch power not to have been in them before. The truth of the matter is, that theſe game-laws do indeed *qualify* nobody, except in the inſtance of a gamekeeper, to kill game: but only to ſave the trouble and formal proceſs of an action by the perſon injured, who perhaps too might remit the offence, theſe ſtatutes inflict *additional* penalties, to be recovered either in a regular or ſummary way, by any of the king's ſubjects, from certain perſons of inferior rank who may be found offending in this particular. But it does not follow that perſons excuſed from theſe additional penalties are therefore *authoriſed* to kill game. The circumſtance of having 100l. *per annum*, and the reſt, are not properly qualifications, but exemptions. And theſe perſons, ſo exempted from the penalties of the game-ſtatutes, are not only liable to actions of treſpaſs by the owners of the land; but alſo, if they kill game within the limits of any royal franchiſe, they are liable to the actions of ſuch who may have the right of chaſe or free-warren therein.

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* M. Paris, 303.

† 9 Hen. III.

Upon the whole, it appears, that the king, by his prerogative, and ſuch perſons as have, under his authority, the ROYAL FRANCHISE of CHACE, PARK, or *Free-WARREN**, are the *only* perſons who may acquire any property, however fugitive and tranſitory, in theſe animals *feræ naturæ*, while living; which is ſaid to be veſted in them *propter privilegium*. And it muſt alſo be obſerved, that ſuch perſons as may thus lawfully hunt, fiſh, or fowl, *ratione privilegii*, have only a qualified property in theſe animals: it not being abſolute or permanent, but laſting only ſo long as the creatures remain within the limits of ſuch reſpective franchiſe or liberty, and ceaſing the inſtant they voluntarily paſs out of it. It is held indeed, that if a man ſtarts any game within his own grounds, and follows it into another's, and kills it there, the property remains in himſelf. And this is grounded on reaſon and natural juſtice: for the property conſiſts in the poſſeſſion; which poſſeſſion commences by the finding it in his own liberty, and is continued by the immediate purſuit. And ſo, if a ſtranger ſtarts game in one man's chaſe or free-warren, and hunts it into another liberty, the property continues in the owner of the chaſe or warren; this property ariſing from privilege, and not being changed by the act of a mere ſtranger. Or if a man ſtarts game on another's private grounds, and kills it there, the property belongs to him on whoſe ground it was killed, becauſe it was alſo ſtarted there; this property ariſing *ratione ſoli*. Whereas if, after being ſtarted there, it is killed in the grounds of a third perſon, the property belongs not to the owner of the firſt ground, becauſe the property is local; nor yet to the owner of the ſecond, becauſe it was not ſtarted in his ſoil; but it veſts in the perſon who ſtarted and killed it, though guilty of a treſpaſs againſt both the owners. See the article *Game-Laws*.

Game-Cock, a fighting cock, or one kept for ſport; a barbarous practice, which is a diſgrace to any civilized nation. See *Cock Fighting*.

GAMELIA, in Grecian antiquity, a nuptial feaſt, or rather ſacrifice, held in the ancient Greek families on the day before a marriage; thus called from a cuſtom they had of ſhaving themſelves on this occaſion, and preſenting their hair to ſome deity to whom they had particular obligations.

GAMELION, in the ancient chronology, was the eighth month of the Athenian year, containing 29 days, and anſwering to the latter part of our January and beginning of February. It was thus called, as being, in the opinion of the Athenians, the moſt proper ſeaſon of the year for marriage.

GAMING, the art of playing or practiſing any game, particularly thoſe of hazard; as cards, dice, tables, &c.

Gaming has at all times been looked upon as a thing of pernicious conſequence to the commonwealth; and is therefore ſeverely prohibited by law. It is conſidered as a practice generally intended to ſupply, or retrieve, the expences occaſioned by LUXURY; it being a kind of tacit confeſſion, that the company engaged therein do, in general, exceed the bounds of their reſpective fortunes; and therefore they caſt lots to determine upon whom the ruin ſhall at preſent fall, that the reſt may be ſaved a little longer. But, taken in any light, it is an offence of the moſt alarming nature; tending, by neceſſary conſequence, to promote public idleneſs, theft, and debauchery, among thoſe of a lower claſs; and, among perſons of a ſuperior rank, it hath frequently been attended with the ſudden ruin and deſolation of ancient and opulent families, an abandoned proſtitution of every principle of honour and virtue, and too often hath ended in ſelf-murder. To reſtrain this pernicious vice among the inferior ſort of people, the ſtat. 33 Hen. VIII. *c.* 9. was made; which prohibits, to all but gentlemen, the games of tennis, tables, cards, dice, bowls, and other unlawful diverſions there ſpecified, unleſs in the time of Chriſtmas, under pecuniary pains and impriſonment. And the ſame law, and alſo the ſtatute 23 Geo. II. *c.* 24. inflict pecuniary penalties, as well upon the maſter of any public houſe wherein ſervants are permitted to game, as upon the ſervants themſelves who are found to be gaming there. But this is not the principal ground of modern complaint: it is the gaming in high life that demands the attention of the magiſtrate; a paſſion to which every valuable conſideration is made a ſacrifice, and which we ſeem to have inherited from our anceſtors the ancient Germans; whom Tacitus deſcribes to have been bewitched with the ſpirit of play to a moſt exor-

* See thoſe articles.

bitant degree. "They addict themſelves (ſays he) to dice (which is wonderful) when ſober, and as a ſerious employment; with ſuch a mad deſire of winning or loſing, that when ſtript of every thing elſe, they will ſtake at laſt their liberty, and their very ſelves. The loſer goes into a voluntary ſlavery; and, though younger and ſtronger than his antagoniſt, ſuffers himſelf to be bound and ſold. And this perſeverance in ſo bad a cauſe they call the point of honour: *ea eſt in re prava pervicacia, ipſi fidem vocant*." One would be almoſt tempted to think Tacitus was deſcribing a modern Engliſhman. When men are thus intoxicated with ſo frantic a ſpirit, laws will be of little avail: becauſe the ſame falſe ſenſe of honour that prompts a man to ſacrifice himſelf, will deter him from appealing to the magiſtrate. Yet it is proper that laws ſhould be, and be known publicly, that gentlemen may conſider what penalties they wilfully incur, and what a confidence they repoſe in ſharpers; who, if ſucceſsful in play, are certain to be paid with honour, or, if unſucceſsful, have it in their power to be ſtill greater gainers by informing. For, by ſtat. 16 Car. II. *c.* 7. if any perſon by playing or betting ſhall loſe more than 100l. at one time, he ſhall not be compellable to pay the ſame; and the winner ſhall forfeit treble the value, one moiety to the king, the other to the informer. The ſtatute 9 Ann. *c.* 14. enacts, that all bonds and other ſecurities, given for money won at play, or money lent at the time to play withal, ſhall be utterly void: that all mortgages and incumbrances of lands, made upon the ſame conſideration, ſhall be and enure to the heir of the mortgager: that, if any perſon at one time loſes 10l. at play, he may ſue the winner, and recover it back by action of debt at law; and, in caſe the loſer does not, any other perſon may ſue the winner for treble the ſum ſo loſt; and the plaintiff in either caſe may examine the defendant himſelf upon oath: and that in any of theſe ſuits no privilege of parliament ſhall be allowed. The ſtatute farther enacts, that if any perſon cheats at play, and at one time wins more than 10l. or any valuable thing, he may be indicted thereupon, and ſhall forfeit five times the value, ſhall be deemed infamous, and ſuffer ſuch corporal puniſhment as in caſe of wilful perjury. By ſeveral ſtatutes of the reign of king George II. all private lotteries by tickets, cards, or dice (and particularly the games of faro, baſſet, ace of hearts, hazard, paſſage, rolly polly, and all other games with dice, except backgammon), are prohibited under a penalty of 200l. for him that ſhall erect ſuch lotteries, and 50l. a-time for the players. Public lotteries, unleſs by authority of parliament, and all manner of ingenious devices, under the denomination of *ſales* or otherwiſe, which in the end are equivalent to lotteries, were before prohibited by a great variety of ſtatutes under heavy pecuniary penalties. But particular deſcriptions will ever be lame and deficient, unleſs all games of mere chance are at once prohibited; the invention of ſharpers being ſwifter than the puniſhment of the law, which only hunts them from one device to another. The ſtat. 13. Geo. II. *c.* 19. to prevent the multiplicity of horſe races, another fund of gaming, directs, that no plates or matches under 50l. value ſhall be run, upon penalty of 200l. to be paid by the owner of each horſe running, and 100l. by ſuch as advertiſe the plate. By ſtatute 18 Geo. II. *c.* 34. the ſtatute 9 Ann. is farther enforced, and ſome deficiencies ſupplied: the forfeitures of that act may now be recovered in a court of equity; and, moreover, if any man be convicted, upon information or indictment, of winning or loſing at any ſitting 10l. or 20l. within 24 hours, he ſhall forfeit five times the ſum. Thus careful has the legiſlature been to prevent this deſtructive vice: which may ſhow that our laws againſt gaming are not ſo deficient, as ourſelves and our magiſtrates in putting thoſe laws in execution.

Chance, or Hazard, in Gaming. Hazard, or chance, is a matter of mathematical conſideration, becauſe it admits of more and leſs. Gameſters either ſet out upon an equality of chance, or are ſuppoſed to do ſo. This equality may be altered in the courſe of the game, by the greater good-fortune or addreſs of one of the gameſters, whereby he comes to have a better chance, ſo that his ſhare in the ſtakes is proportionably better than at firſt. This more and leſs runs through all the ratios between equality and infinite difference, or from an infinitely little difference till it come to an infinitely great one, whereby the game is determined. The whole game, therefore, with regard to the iſſue of it, is a chance of the proportion the two ſhares bear to each other.

The probability of an event is greater or leſs, according to the number of chances by which it may happen, compared with the number of all the chances by which it may either happen or fail.

M. de Moivre, in a treatiſe *de Menſura Sortis*, has computed the variety of chances in ſeveral caſes that occur in gaming, the laws of which may be underſtood by what follows.

Suppoſe p the number of caſes in which an event may happen, and q the number of caſes wherein it may not happen, both ſides have the degree of probability, which is to each other as p to q.

If two gameſters, A and B, engage on this footing, that, if the caſes p happen, A ſhall win; but if q happen, B ſhall win, and the ſtake be a; the chance of A will be $\frac{pa}{q+p}$, and that of B $\frac{qa}{p+q}$; conſequently, if they ſell the expectancies, they ſhould have that for them reſpectively.

If A and B play with a ſingle die, on this condition, that, if A throw two or more aces at eight throws, he ſhall win; otherwiſe B ſhall win; What is the ratio of their chances? Since there is but one caſe wherein an ace may turn up, and five wherein it may not, let $a=1$, and $b=5$. And again, ſince there are eight throws of the die, let $n=8$; and you will have $\overline{a+b}|^n-b^n-nab^n-1$, to b^n+nab^n-1: that is, the chance of A will be to that of B as 663991 to 10156525, or nearly as 2 to 3.

A and B are engaged at ſingle quoits; and, after playing ſome time, A wants 4 of being up, and B 6; but B is ſo much the better gameſter, that his chance againſt A upon a ſingle throw would be as 3 to 2; What is the ratio of their chances? Since A wants 4, and B 6, the game will be ended at nine throws; therefore, raiſe $a+b$ to the ninth power, and it will be $a^9+9\,a^8b+36\,a^7bb+84\,a^6b^3+126\,a^5b^4+126\,a^4b^5$, to $84\,a^3b^6+36\,aab^7+6ab^3+b^9$: call a 3, and b 2, and you will have the ratio of chances in numbers, viz. 1759077 to 194048.

A and B play at ſingle quoits, and A is the beſt gameſter, ſo that he can give B 2 in 3: What is the ratio of their chances at a ſingle throw? Suppoſe the chances as z to 1, and raiſe $z+1$ to its cube, which will be z^3+3z^2+3z+1. Now ſince A could give B 2 out of 3, A might undertake to win three throws running; and conſequently the chances in this caſe will be as z^3 to $3z^2+3z+1$. Hence $z^3=3z^2+3z+1$; or $2z^3=z^3+3z^2-3z+1$. And therefore $z\sqrt[3]{2}=z+1$; and, conſequently, $z=\frac{1}{\sqrt[3]{2}-1}$. The chances, therefore, are $\frac{1}{\sqrt[3]{2}-1}$, and 1, reſpectively.

Again, ſuppoſe I have two wagers depending, in the firſt of which I have 3 to 2 the beſt of the lay, and in the ſecond 7 to 4; What is the probability I win both wagers?

1. The probability of winning the firſt is $\frac{3}{5}$, that is the number of chances I have to win, divided by the number of all the chances: the probability of winning the ſecond is $\frac{7}{11}$: therefore, multiplying theſe two fractions together, the product will be $\frac{21}{55}$, which is the probability of winning both wagers. Now, this fraction being ſubtracted from 1, the remainder is $\frac{34}{55}$, which is the probability I do not win both wagers: therefore the odds againſt me are 34 to 21.

2. If I would know what the probability is of winning the firſt, and loſing the ſecond, I argue thus: the probability of winning the firſt is $\frac{3}{5}$, the probability of loſing the ſecond is $\frac{4}{11}$: therefore multiplying $\frac{3}{5}$ by $\frac{4}{11}$, the product $\frac{12}{55}$ will be the probability of my winning the firſt, and loſing the ſecond; which being ſubtract-tracted from 1, there will remain $\frac{43}{55}$, which is the probability I do not win the firſt, and at the ſame time loſe the ſecond.

3. If I would know what the probability is of winning the ſecond, and at the ſame time loſing the firſt, I ſay thus: The probability of winning the ſecond is $\frac{7}{11}$; the probability of loſing the firſt is $\frac{2}{5}$: therefore, multiplying theſe two fractions together, the product $\frac{14}{55}$ is the probability I win the ſecond, and alſo loſe the firſt.

4. If I would know what the probability is of loſing both wagers, I ſay, the probability of loſing the firſt is $\frac{2}{5}$, and the probability of loſing the ſecond $\frac{4}{11}$: therefore the probability of loſing them both is $\frac{8}{55}$: which, being ſubtracted from 1, there remains $\frac{47}{55}$: therefore, the odds of loſing both wagers is 47 to 8.

This way of reaſoning is applicable to the happening or failing of any events that may fall under conſideration. Thus if I would know what the probability is of miſſing an ace four times together with a die, this I conſider as the failing of four different events. Now the probability of miſſing the firſt is $\frac{5}{6}$, the ſecond is alſo $\frac{5}{6}$, the third $\frac{5}{6}$, and the fourth $\frac{5}{6}$; therefore the probability of miſſing it four times together is $\frac{5}{6}\times\frac{5}{6}\times\frac{5}{6}\times\frac{5}{6}=\frac{625}{1296}$; which being ſubtracted from 1, there will remain $\frac{671}{1296}$ for the probability of throwing it once or oftener in four times: therefore the odds of throwing an ace in four times, is 671 to 625.

But if the flinging of an ace was undertaken in three times, the probability of miſſing it three times would be $\frac{5}{6}\times\frac{5}{6}\times\frac{5}{6}=\frac{125}{216}$; which being ſubtracted from 1, there will remain $\frac{91}{216}$ for the probability of throwing it once or oftener in three times: therefore the odds againſt throwing it in three times are 125 to 91. Again, ſuppoſe we would know the probability of throwing an ace once in four times, and no more: ſince the probability of throwing it the firſt time is $\frac{1}{6}$, and of miſſing it the other three times, is $\frac{5}{6}\times\frac{5}{6}\times\frac{5}{6}$, it follows, that the probability of throwing it the firſt time, and miſſing it the other three ſucceſſive times, is $\frac{1}{6}\times\frac{5}{6}\times\frac{5}{6}\times\frac{5}{6}=\frac{125}{1296}$; but becauſe it is poſſible to hit every throw as well as the firſt, it follows, that the probability of throwing it once in four throws, and miſſing it the other three, is $\frac{4\times125}{1296}=\frac{500}{1296}$; which being ſubtracted from 1, there will remain $\frac{796}{1296}$ for the probability of throwing it once, and no more, in four times. Therefore, if one undertake to throw an ace once, and no more, in four times, he has 500 to 796 the worſt of the lay, or 5 to 8 very near.

Suppoſe two events are ſuch, that one of them has twice as many chances to come up as the other; what is the probability, that the event, which has the greater number of chances to come up, does not happen twice before the other happens once, which is the caſe of flinging 7 with two dice before 4 once? Since the number of chances is as 2 to 1, the probability of the firſt happening before the ſecond is $\frac{2}{3}$, but the probability of its happening twice before it is but $\frac{2}{3}\times\frac{2}{3}$ or $\frac{4}{9}$: therefore it is 5 to 4 ſeven does not come up twice before four once.

But, if it were demanded, what muſt be the proportion of the facilities of the coming up of two events, to make that which has the moſt chances come up twice, before the other comes up once? The anſwer is, 12 to 5 very nearly: whence it follows, that the probability of throwing the firſt before the ſecond is $\frac{12}{17}$, and the probability of throwing it twice is $\frac{12}{17}\times\frac{12}{17}$, or $\frac{144}{289}$: therefore the probability of not doing it is $\frac{145}{289}$: therefore the odds againſt it are as 145 to 144, which comes very near an equality.

Suppoſe there is a heap of thirteen cards of one colour, and another heap of thirteen cards of another colour; What is the probability, that, taking one card at a venture out of each heap, I ſhall take out the two aces?

The probability of taking the ace out of the firſt heap is $\frac{1}{13}$, the probability of taking the ace out of the ſecond heap is $\frac{1}{13}$; therefore the probability of taking out both aces is $\frac{1}{13}\times\frac{1}{13}=\frac{1}{169}$, which being ſubtracted from 1, there will remain $\frac{168}{169}$: therefore the odds againſt me are 168 to 1.

In caſes where the events depend on one another, the manner of arguing is ſomewhat altered. Thus, ſuppoſe that out of one ſingle heap of thirteen cards of one colour I ſhould undertake to take out firſt the ace; and, ſecondly, the two: though the probability of taking out the ace be $\frac{1}{13}$, and the probability of taking out the two be likewiſe $\frac{1}{13}$: yet, the ace being ſuppoſed as taken out already, there will remain only twelve cards in the heap, which will make the probability of taking out the two to be $\frac{1}{12}$; therefore the probability of taking out the ace, and then the two, will be $\frac{1}{13}\times\frac{1}{12}$.

In this laſt queſtion the two events have a dependence on each other; which conſiſts in this, that one of the events being ſuppoſed as having happened, the probability of the other's happening is thereby altered. But the caſe is not ſo in the two heaps of cards.

If the events in queſtion be *n* in number, and be ſuch as have the ſame number *a* of chances by which they may happen, and likewiſe the ſame number *b* of chances by which they may fail, raiſe $a+b$ to the power *n*. And if A and B play together, on condition that if either one or more of the events in queſtion happen, A ſhall win, and B loſe, the probability of A's winning will be $\frac{\overline{a\times b}|^{n}-b^{n}}{\overline{a+b}|^{n}}$; and that of B's winning will be $\frac{b^{n}}{\overline{a+b}|}$; for when $a+b$ is actually raiſed to the power *n*, the only term in which *a* does not occur is the laſt b^{n}: therefore all the terms but the laſt are favourable to A.

Thus if $n=3$, raiſing $a+b$ to the cube $a^3+3a^3b+3ab^2+b^3$, all the terms but b^3 will be favourable to A; and therefore the probability of A's winning will be $\frac{a^3+3a^2b+3ab^2}{\overline{a+b}|}$, or $\frac{\overline{a+b}|^{3}-b^{3}}{\overline{a+b}|^{3}}$; and the probability of B's winning will be $\frac{b^3}{\overline{a+b^3}|}$. But if A and B play on condition, that if either two or more of the events in queſtion happen, A ſhall win; but in caſe one only happen, or none, B ſhall win; the probability of A's winning will be $\frac{\overline{a+b}|^{n}-nab^{n-1}-b^{n}}{\overline{n+b}|^{n}}$; for the only two terms in which *aa* does not occur, are the two laſt, viz. nab^{n-1} and b^{n}.

GAMMONING, among ſeamen, denotes ſeveral turns of a rope taken round the bowſprit, and reeved through holes in knees of the head, for the greater ſecurity of the bowſprit.

GAMMUT, GAMUT, *GAM-ut*, in muſic, a ſcale whereon we may learn to ſound the muſical notes, *ut*, *re*, *mi*, *fa*, *ſol*, *la*, in their ſeveral orders and diſpoſitions. See MUSIC.

The invention of this ſcale is owing to Guido Aretin, monk of Arezzo, in Tuſcany, about the year 1009; though it is not ſo properly an invention, as an improvement on the diagram or ſcale of the ancients. See ARETIN.

Several alterations have been made in the gammut. M. le Maire, particularly, has added a ſeventh note; viz. *ſi*; and the Engliſh uſually throw out both *ut* and *ſi*, and make the other five ſerve for all.

GANDER, in ornithology, the male of the gooſe-kind; one of which, it is ſaid, will ſerve five geeſe. See ANAS.

GANG-WAY, is the ſeveral paſſages or ways from one part of the ſhip to the other; and whatſoever is laid in any of thoſe paſſages, is ſaid to lie in the gang-way.

GANGANELLI. See CLEMENT XIV.

GANGES, a large and celebrated river of India. It has its ſource in the mountains which border on Little Thibet, in 96 degrees of longitude, and 35. 45. of latitude. It croſſes ſeveral kingdoms, running from north to ſouth; and falls into the bay of Bengal, by ſeveral mouths. The waters are loweſt in April and May, and higheſt before the end of September. It overflows yearly like the Nile; and renders the kingdom of Bengal as fruitful as that of the Delta in Egypt. The people in theſe parts hold the water of this river in high veneration; and it is viſited annually by a prodigious number of pilgrims from all parts of India. The Engliſh have ſeveral ſettlements on this river, which will be taken notice of in their proper places. The greateſt happineſs that many of the Indians wiſh for, is to die in this river.

GANGLION, in anatomy, denotes a knot frequently found in the courſe of the nerves, and which is not morbid; for whenever any nerve ſends out a branch, or receives one from another, or where two nerves join together, there is generally a ganglion or plexus, as may be ſeen at the beginning of all the nerves of the medulla ſpinalis, and in many other places of the body.

GANGLION, in ſurgery, a hard tubercle, generally moveable, in the external or internal part of the carpus, upon the tendons or ligaments in that part; uſually without any pain to the patient.

GANGRENE, a very great and dangerous degree of inflammation, wherein the parts affected begin to corrupt, and put on a ſtate of putrefaction. See MEDICINE, and SURGERY.

GANNET, or *SOLAND Gooſe*, in ornithology. See PELICANUS.

GANTLET, or GAUNTLET, a large kind of glove made of iron, and the fingers covered with ſmall plates. It was formerly worn by the cavaliers, when armed at all points. The word is derived of the French *gantelet*; and that from *gand* or *gant*, "glove."

The caſque and gauntlets were always borne in the ancient marches in ceremony. Gauntlets were not introduced till about the 13th century.

The gauntlet was frequently thrown like the glove, by way of challenge.

GANTLOPE. See GAUNTLOPE.

GANYMEDE, in mythology, a beautiful youth of Phrygia, ſon of Tros and brother to Ilus; according to Lucian, he was the ſon of Dardanus. Jupiter was charmed with him; and carrying him away, made him his cup-bearer in the room of Hebe. Some ſay that he cauſed him to be carried away by an eagle, and others affirm he was himſelf the raviſher under the form of that bird. He deified this youth; and to comfort his father, made a preſent to him of ſome of thoſe very ſwift horſes that the gods rode upon.

GAOL (*Gaola*, Fr. *Geole*. i. e. *Caveola*, "a cage for birds"), is uſed metaphorically for a priſon. It is a ſtrong place or houſe for keeping of debtors, &c. and wherein a man is reſtrained of his liberty to anſwer an offence done againſt the laws: and every county hath two goals, one for debtors, which may be any houſe where the ſheriff pleaſes; the other for the peace and matters of the crown, which is the county gaol.

If a gaol be out of repair, or inſufficient, &c. juſtices of peace, in their quarter ſeſſions, may contract with workmen for the rebuilding or repairing it; and by their warrant order the ſum agreed on for that purpoſe to be levied on the ſeveral hundreds, and other diviſions in the county by a juſt rate, 11 & 12 Wil. III. c. 19. See PRISON.

GAOL-Delivery. The adminiſtration of juſtice being originally in the crown, in former times our kings in perſon rode through the realm once in ſeven years, to judge of and determine crimes and offences; afterwards juſtices in eyre were appointed; and ſince, juſtices of aſſiſe and gaol-delivery, &c. A commiſſion of gaol-delivery, is a patent in nature of a letter from the king to certain perſons, appointing them his juſtices, or two or three of them, and authoriſing them to deliver his gaol, at ſuch a place, of the priſoners in it: for which purpoſe it commands them to meet at ſuch a place, at the time they themſelves ſhall appoint; and informs them, that, for the ſame purpoſe, the king hath commanded his ſheriff of the ſame county to bring all the priſoners of the gaol, and their attachments, before them at the day appointed.

The juſtices of gaol-delivery are empowered by the common law to proceed upon indictments of felony, treſpaſs, &c. and to order to execution or reprieve: they may likewiſe diſcharge ſuch priſoners, as on their trials are acquitted, and thoſe againſt whom, on proclamation being made, no evidence has appeared: they have authority to try offenders for treaſon, and to puniſh many particular offences, by ſtatute 2 *Hawk.* 24. 2 *Hale's hiſt. Placit. Cor.* 35.

GAOLER, the keeper of a gaol or priſon. Sheriffs are to make ſuch gaolers for whom they will be anſwerable: but if there be any default in the gaoler, an action lies againſt him for an eſcape, &c. yet the ſheriff is moſt uſually charged; 2 Inſt. 592. Where a gaoler kills a priſoner by hard uſage, it is felony; 3 Inſt. 52. No fee ſhall be taken by gaolers, but what is allowed by law, and ſettled by the judges, who may determine petitions againſt their extortions, &c. 2. Geo. II. c. 22.

GAONS, a certain order of Jewiſh doctors, who appeared in the Eaſt, after the cloſing of the talmud. The word *Gaons* ſignifies "excellent, ſublime;" as in the divinity-ſchools we formerly had Irrefragable, Sublime, Reſolute, Angelic, and Subtile doctors. The Gaons ſucceeded the Seburræans or Opiners, about the beginning of the ſixth century. Chanan Meiſchtia was the head, and firſt of the excellents. He reſtored the academy of Pandebita, which had been ſhut up for 30 years.

GAR-FISH, *HORN-fiſh*, or *Sea-needle*. See ESOX.

GARAMA (anc. geog.), the capital of the Garamantes in Libya Interior; near the ſprings of the Cinyphus, now in ruins. Garamantes the people. It lay to the ſouth of the Gætulia, extending from the ſprings of the Cinyphus, and the adjacency of the river Gir, to the mountains which form at the *Vallis Garamantica* (Pliny); or from the ſprings of the Bagrades to the lake Nuba (Ptolemy).

GARAMOND (Claude), a very ingenious letter-founder, was born at Paris; where he began, in the year 1510, to found his printing types free from all the remains of the Gothic, or (as it is generally called) the *black letter*, and brought them to ſuch perfection, that he had the glory of ſurpaſſing all who went before him, and of being ſcarcely ever excelled by his ſucceſſors in that uſeful art. His types were prodigiouſly multiplied; both by the great number of matrices he ſtruck, and the types formed in reſemblance of his in all parts of Europe. Thus in Italy, Germany, England, and Holland, the bookſellers, by way of recommending their books, diſtinguiſhed the type by his name; and in particular the ſmall Roman was by way of excellence known among the printers of theſe nations by the name of *Garamond's ſmall Roman*. By the ſpecial command of king Francis I. he founded three ſizes of Greek types for the uſe of Robert Stephens, who with them printed all his beautiful editions of the New Teſtament, and other Greek authors. He died at Paris in 1561.

GARASSE (Francis), a remarkable jeſuitical writer, the firſt author of that irreconcilable enmity that ſtill ſubſiſts between the Jeſuits and Janſeniſts in the church of Rome, was born at Angouleſme in 1585: and entered the Jeſuits college in 1600. As he had a quick imagination, a ſtrong voice, and a peculiar turn to wit, he became a popular preacher in the chief cities of France; but not content with this honour, he diſtinguiſhed himſelf ſtill more by his writings, which were bold, licentious, and produced much controverſy. The moſt conſiderable in its conſequences was intitled *La ſomme theologique des veritez capitales de la religion Cretienne;* which was firſt attacked by the abbot of St Cyran, who obſerving in it a prodigious number of falſifications of the ſcriptures and of the fathers, beſides many heretical and impious opinions, conceived the honour of the church required him to undertake a refutation. Accordingly he publiſhed a full anſwer to it; while Garaſſe's book was alſo under examination of the doctors of the Sorbonne, by whom it was afterwards condemned. Garaſſe replied to St Cyran; but the two parties of Jeſuits and Janſeniſts, of whom theſe were reſpectively the champions, grew to an implacable animoſity againſt each other, that is not even now likely to ſubſide. The Jeſuits were forced to remove their brother to a diſtance from Paris; where, probably weary of his inactive obſcurity, when the plague raged at Poictiers in 1631, he begged leave of his ſuperior to attend the ſick, in which charitable office he caught the diſorder, and died.

GARBE, in heraldry, a ſheaf of any kind of grain, borne in ſeveral coats of arms, and ſaid to repreſent ſummer, as a bunch of grapes does autumn.

GARBLE, a word uſed to ſignify the action of ſeparating the droſs and duſt from ſpice, drugs, &c. *Garbling* is the cleanſing and purifying the good from the bad; and may come from the Italian *garbo*, i. e. finery or neatneſs: and hence, probably, we ſay, when we ſee a man in a neat habit, that he is in handſome *garb*.

GARCILASSO (de la Vega), a celebrated Spaniſh poet, born of a noble family at Toledo in 1500. He was educated near the emperor Charles V. who had a particular regard for him, and whom he attended in all his military expeditions; acquiring as much renown by his courage as by his poetry. In Provence he commanded a battalion; and was killed in the 36th year of his age, by a ſtone thrown at his head by a country man from a turret. He had ſtrong natural talents for poetry; and not only extended the bounds, but introduced new beauties, into that of the Spaniſh language.—We muſt not confound this poet with another perſon of the ſame name, a native of Cuſco, who wrote in Spaniſh a Hiſtory of Florida, and of Peru and the Incas.

GARCINIA, in botany: A genus of the monogynia order, belonging to the dodecandria claſs of plants; and in the natural method ranking under the 18th order, *Bicornes*. The calyx is tetraphilous inferior; there are four petals; the berry is octoſpermous; and crowned with a ſhield-like ſtigma. There is but one ſpecies, the mangoſtana, a tree of great elegance, and producing the moſt pleaſant fruit of any yet known. See Plate CCVI.

This tree has been very accurately deſcribed by Dr Garcin *, in the 35th voloume of the Philoſophical Tranſactions. It grows, he informs us, to about 17 or 18 feet high, "with a ſtraight taper ſtem like a fir," having a regular tuft in form of an oblong cone, compoſed of many branches and twigs, ſpreading out equally on all ſides, without leaving any hollow. Its leaves, he obſerves, are oblong, pointed at both ends, entire, ſmooth, of a ſhining green on the upper ſide, and of an olive on the back. Its flower is compoſed of four petals, almoſt round, or a little pointed: their colour reſembles that of a roſe, only depeer and leſs lively. The calyx of this flower is of one piece, expanded, and cut into four lobes. The two upper lobes are ſomething larger than the lower ones; they are greeniſh on the outſide, and of a fine deep red within; the red of the upper is more lively than that of the lower ones. This calyx incloſes all parts of the flower; it is ſupported by a pedicle, which is green and conſtantly comes out of the end of a twig above the laſt pair of leaves. The fruit is round, of the ſize of a ſmall orange, from an inch and an half to two inches diameter. The body of this fruit is a capſula of one cavity, compoſed of a thick rind a little like that of a pomegranate, but ſofter, thicker, and fuller of juice. Its thickneſs is commonly of a quarter of an inch. Its outer colour is of a dark brown purple, mixed with a little grey and dark green. The inſide of the peel is of a roſe colour, and its juice is purple. Laſt of all, the ſkin is of a ſtyptic or aſtringent taſte, like that of a pomegranate, nor does it ſtick to the fruit it contains. The inſide of this fruit is a furrowed globe, divided into ſegments, much like thoſe of an orange, but unequal in ſize, which do not adhere to each other. The number of theſe ſegments is always equal to that of the rays of the top which covers the fruit. The fewer there are of theſe ſegments, the bigger they are. There are often in the ſame fruit ſegments as big again as any of thoſe that are on the ſide of them. Theſe ſegments are white, a little tranſparent, fleſhy, membranous, full of juice like cherries or raſberries; of a taſte of ſtrawberries and grapes together. Each of the ſegments incloſes a ſeed of the figure and ſize of an almond ſtripped of its ſhell, having a protuberance on one of its ſides. Theſe ſeeds are covered with two ſmall ſkins, the outermoſt of which ſerves for a baſis to the filaments and membranes of which the pulp is compoſed. The ſubſtance of thoſe ſeeds comes very near that of cheſnuts, as to their conſiſtency, colour and aſtringent quality.

"This tree (according to our author) originally grows in the Molucca iſlands, where it is called *mangoſtan*; but has been tranſplanted from thence to the iſland of Java and Malaca, at which laſt place it thrives very well. Its tuft is ſo fine, ſo regular, ſo equal, and the appearance of its leaves ſo beautiful, that it is at preſent looked upon at Batavia as the moſt proper for adorning a garden, and affording an agreeable ſhade. There are few ſeeds, however (he obſerves), to be met with in this fruit that are good for planting, moſt part of them being abortive."— He concludes his deſcription by mentioning, that one may eat a great deal of this fruit without any inconvenience; and that it is the only one which ſick people may be allowed to eat without any ſcruple.

Other writers concur in their praiſes of this fruit. Rumphius obſerves, that the mangoſtan is univerſally acknowledged to be the beſt and wholeſomeſt fruit that grows in India; that its fleſh is juicy, white, almoſt tranſparent, and of as delicate and agreeable a flavour as the richeſt grapes: the taſte and ſmell being ſo grateful, that it is ſcarce poſſible to be cloyed with eating it.—He adds, that when ſick people have no reliſh for any other food, they generally eat this with great delight; but ſhould they refuſe it, their recovery is no longer expected. "It is remarkable (ſays he) that the mangoſtan is given with ſafety in almoſt every diſorder. The dried bark is uſed with ſucceſs in the dyſentery and teneſmus; and an infuſion of it is eſteemed a good gargle for a ſore mouth or ulcers in the throat. The Chineſe dyers uſe this bark for the ground or baſis of a black colour, in order to fix it the firmer."

According to Captain Cook, in his Voyage round the World, vol. iii. p. 737, the garcinia mangoſtana of Linnæus is peculiar to the Eaſt Indies. It is about the ſize of the crab-apple, and of a deep red wine colour. On the top of it is the figure of five or ſix ſmall triangles joined in a circle; and at the bottom ſeveral hollow green leaves, which are remains of the bloſſom. When they are to be eaten, the ſkin, or rather fleſh, muſt be taken of; under which are found ſix or ſeven white kernels, placed in a circular order; and the pulp with which theſe are inveloped in the fruit, than which nothing can be more delicious. It is a happy mixture of the tart and the ſweet, which is no leſs wholeſome than pleaſant; and, as well as the ſweet orange, is allowed in any qauntity to thoſe who are afflicted with fevers either of the putrid or inflammatory kind.

GARCON, or GARSOON, a French term, literally ſignifying a boy or male child any time before his marriage.—It is alſo applied to divers inferior officers, among us called *grooms, garçiones*. Thus all the ſervants in the French king's chambers, wardrobe, &c. who do the leſſer offices thereof under the proper officers, are called *garçons de la chambre, de la garderobe*, &c.

GARDANT, or GUARDANT, in heraldry, denotes any beaſt full-faced, and looking right forward.

GARDEN, a piece of ground properly laid out, cultivated, and ornamented with a variety of plants, flowers, fruits, &c. See GARDENING.

Gardens are uſually diſtinguiſhed into flower-garden, fruit-garden, and kitchen-garden: the firſt of which, being deſigned for pleaſure and ornament, is to be placed in the moſt conſpicuous part, that is, next to the back-front of the houſe; and the two latter, being deſigned for uſe, ſhould be placed leſs in ſight. But though the fruit and kitchen gardens, are here mentioned as two diſtinct gardens, yet they are now uſually in one; and that with good reaſon, ſince they both require a good ſoil and expoſure, and equally require to be placed out of the view of the houſe. See *KITCHEN-Garden*.

In the choice of a place proper for the garden, the moſt eſſential points to be conſidered are the ſituation, the ſoil, the expoſure, water, and proſpect.

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* In honour of whom as its moſt accurate deſcriber Linnæus gave it the name *Garcinia*.

1ſt, As to the ſituation, it ought to be ſuch a one as is wholeſome, and in a place neither too high nor too low; for if a garden to be too high, it will be expoſed to the winds which are very prejudicial to trees; and if it be too low, the dampneſs, the vermin, and the venomous creatures that breed in ponds and marſhy places, add much to their inſalubrity. The moſt happy ſituation is on the ſide of a hill, eſpecially if the ſlope be eaſy, and in a manner imperceptible; if a good deal of level ground be near the houſe; and if it abounds with ſprings of water: for, being ſheltered from the fury of the winds, and the violent heat of the ſun, a temperate air will be there enjoyed; and the water that deſcends from the top of the hill, either from ſprings or rain, will not only ſupply fountains, canals, and caſcades for ornaments, but, when it has performed its office, will water the adjacent valleys, and, if it be not ſuffered to ſtagnate, will render them fertile and wholeſome.

2dly, A good earth or ſoil is next to be conſidered; for it is ſcarce poſſible to make a fine garden in a bad ſoil. There are indeed ways to meliorate ground, but they are very expenſive; and ſometimes, when the expence has been beſtowed of laying good earth three feet deep over the whole ſurface, a whole garden has been ruined, when the roots of the trees have come to reach the natural bottom. To judge of the quality of the ſoil, obſerve whether their be any heath, thiſtles, or ſuch like weeds, growing ſpontaneouſly in it; for they are certain ſigns that the ground is poor. Or if there be large trees growing thereabouts, obſerve whether they grow crooked, ill-ſhaped, and grubby; and whether they are of a faded green, and full of moſs, or infeſted with vermin: if this be the caſe, the place is to be rejected. But, on the contrary, if it be covered with good graſs fit for paſture, you may then be encouraged to try the depth of the ſoil. To know this, dig holes in ſeveral places, ſix feet wide and four deep; and if you find three feet of good earth it will do very well, but leſs than two will not be ſufficient. The quality of ground is, neither to be too ſtony nor too hard to work; neither too dry, too moiſt, nor too ſandy and light; nor too ſtrong and clayey, which is the worſt of all for gardens.

3dly, The next requiſite is water; the want of which is one of the greateſt inconveniences that can attend a garden, and will bring a certain mortality upon whatever is planted in it, eſpecially in the greater droughts that often happen in a hot and dry ſituation in ſummer; beſides its uſefulneſs in fine gardens for making fountains, canals, caſcades, &c. which are the greateſt ornaments of a garden.

4thly, The laſt thing to be conſidered is the proſpect of a fine country; and though this is not ſo abſolutely neceſſary as water, yet it is one of the moſt agreeable beauties of a fine garden: beſides, if a garden be planted in a low place that has no kind of proſpect, it will not only be diſagreeable, but unwholeſome.

In the laying out and planting of gardens, the beauties of nature ſhould always be ſtudied; for the nearer a garden approaches to nature, the longer it will pleaſe. According to Mr Miller, the area of a handſome garden may take up 30 or 40 acres, but not more; and the following rules ſhould be obſerved in the diſpoſition of it. There ought always to be a deſcent of at leaſt three ſteps from the houſe to the garden; this will render the houſe more dry and wholeſome, and the proſpect on entering the garden more extenſive. The firſt thing that ought to peſent itſelf to view ſhould be an open lawn of graſs, which ought to be conſiderably broader than the front of the building; and if the depth be one-half more than the width, it will have a better effect: if on the ſides of the lawn, there are trees planted irregularly, by way of open groves, the regularity of the lawn will be broken, and the whole rendered more like nature. For the convenience of walking in damp weather, this lawn ſhould be ſurrounded with a gravel-walk, on the outſide of which ſhould be borders three or four feet wide for flowers: and from the back of theſe the proſpect will be agreeably terminated by a ſlope of ever-green ſhrubs; which, however, ſhould never be ſuffered to exclude agreeable proſpects, or the view of handſome buildings. Theſe walks may lead through the different plantations, gently winding about in an eaſy natural manner; which will be more agreeable than either thoſe long ſtraight walks, too frequently ſeen in gardens, or thoſe ſerpentine windings that are twiſted about into ſo many ſhort turns as to render it difficult to walk in them; and as no garden can be pleaſing where there is a want of ſhade and ſhelter, theſe walks ſhould lead as ſoon as poſſible into plantations, where perſons may walk in private, and be ſheltered from the wind.

Narrow rivulets, if they have a conſtant ſtream, and are judiciouſly led about a garden, have a better effect than many of the large ſtagnating ponds or canals ſo frequently made in large gardens. When wilderneſſes are intended, they ſhould not be cut into ſtars and other ridiculous figures, nor formed into mazes or labyrinths, which in a great deſign appear trifling.

In ſhort, the ſeveral parts of a garden ſhould be diverſified; but in places where the eye takes in the whole at once, the two ſides ſhould be always the ſame. In the buſineſs of deſigns, the aim ſhould be always at what is natural, great, and noble. The general diſpoſition of a garden and of its parts ought to be accommodated to the different ſituations of the ground, to humour its inequalities, to proportion the number and ſorts of trees and ſhrubs to each part, and to ſhut out from the view of the garden no objects that may become ornamental. But for a more extended view of this ſubject, ſee the article GARDENING.

A practical attention to a garden, is by ſome eſteemed a degrading employment. It is true, indeed, that paſtoral and agricultural manners, if we may form a judgment from the dignified deſcriptions of Virgil, are greatly degenerated. The employments of ſhepherds and huſbandmen are now become mean and ſordid. The work of the garden is uſually left to a peaſant. Nor is it unreaſonable to aſſign the labour, which wearies without amuſement, to thoſe who are ſufficiently amuſed by the proſpect of their wages. But the operations of grafting, of inoculating, of pruning, of tranſplanting, are curious experiments in natural philoſophy; and that they are pleaſing as well as curious, thoſe can teſtify who remember what they felt on ſeeing their attempts in the amuſement of practical gardening attended with ſucceſs. Among the em-

employments ſuitable to old age, Cicero has enumerated the ſuperintendence of a garden. It requires no great exertion of mind or body; and its ſatisfactions are of that kind which pleaſe without violent agitation. Its beneficial influence on health is an additional reaſon for an attention to it at an age when infirmities abound.

In almoſt every deſcription of the ſeats of the bleſſed, ideas of a garden ſeems to have predominated. The word Paradiſe itſelf is ſynonymous with garden. The fields of Elyſium, that ſweet region of poeſy, are adorned with all that imagination can conceive to be delightful. Some of the moſt pleaſing paſſages of Milton, are thoſe in which he repreſents the happy pair engaged in cultivating their bliſsful abode. Poets have always been delighted with the beauties of a garden. Lucan is repreſented by Juvenal as repoſing in his garden. Virgil's Georgics prove him to have been captivated with rural ſcenes; though, to the ſurpriſe of his readers, he has not aſſigned a book to the ſubject of a garden. Shenſtone made it his ſtudy; but, with all his taſte and fondneſs for it, he was not happy in it. The captivating ſcenes which he created at the Leaſowes, afforded him, it is ſaid, little pleaſure in the abſence of ſpectators. The truth is, he made the embelliſhment of his grounds, which ſhould have been the amuſement of his life, the buſineſs of it; and involved himſelf in ſuch troubles, by the expences it occaſioned, as neceſſarily excluded tranquil enjoyment.

It is the lot of few, in compariſon, to poſſeſs territories like his, extenſive, and ſufficiently well-adapted to conſtitute an ornamented farm. Still fewer are capable of ſupporting the expence of preſerving it in good condition. But let not the rich ſuppoſe they have appropriated the pleaſures of a garden. The poſſeſſor of an acre, or a ſmaller portion, may receive a real pleaſure, from obſerving the progreſs of vegetation, even in a plantation of culinary plants. A very limited tract, properly attended to will furniſh ample employment for an individual. Nor let it be thought a mean care; for the ſame hand that raiſed the cedar, formed the hyſop on the wall. Even the orchard, cultivated ſolely for advantage, exhibits beauties unequalled in the ſhrubbery; nor can the green-houſe produce an appearance to exceed the bloſſom of the apple and the almond.

Hanging GARDENS, in antiquity, gardens raiſed on arches by Nebuchadnezzer king of Babylon, in order to gratify his new wife Amyctis, daughter of Aſtyages king of Media. Q. Curtius makes them equal in height to the walls of the city, viz. 50 feet. They contained a ſquare of 400 feet on every ſide, and were carried up into the air in ſeveral terraces laid above one another, and the aſcent from terrace to terrace was by ſtairs 10 feet wide. The arches ſuſtaining the whole pile were raiſed above one another, and it was ſtrengthened by a wall, ſurrounding it on every ſide, of 22 feet in thickneſs. The floors of each of the terraces were laid in the following manner: on the top of the arches were firſt laid large flat ſtones 16 feet long and 4 broad, and over them was a layer of reed mixed with a great quantity of bitumen, over which were two rows of bricks cloſely cemented together by plaſter, and over all were laid thick ſheets of lead; and laſtly, upon the lead was laid the mould of the garden. The mould or earth was of ſuch a depth as to admit the largeſt trees to take root and grow; and it was covered with various kinds of trees, plants, and flowers. In the upper terrace there was an aqueduct or engine, whereby water was drawn up out of the river for watering the whole garden.

Floating GARDENS. We are informed by the abbé Clavigero in his Hiſtory of Mexico, that when the Mexicans were brought under ſubjection to the Colhuan and Tepanecan nations, and confined to the miſerable little iſlands on the lake of Mexico, they ceaſed for ſome years to cultivate the land, becauſe they had none, until neceſſity and induſtry together taught them to form moveable fields and gardens, which floated on the waters of the lake. The method which they purſued to make thoſe, and which they ſtill practiſe, is extremely ſimple. They plait and twiſt willows and roots of marſh plants or other materials together, which are light, but capable or ſupporting the earth of the garden firmly united. Upon this foundation they lay the light buſhes which float on the lake; and over all, the mud and dirt which they draw up from the bottom of the ſame lake. Their regular figure is quadrangular; their length and breadth various; but generally they are about eight perches long, and not more than three in breadth, and have leſs than a foot of elevation above the ſurface of the water. Theſe were the firſt fields which the Mexicans owned after the foundation of Mexico; there they firſt cultivated the maize, great pepper, and other plants neceſſary for their ſupport. In progreſs of time, as thoſe fields grew numerous from the induſtry of the people, there were among them gardens of flowers and odoriferous plants, which were employed in the worſhip of their gods, and ſerved for the recreation of the nobles. At preſent they cultivate flowers and every ſort of garden herbs upon them. Every day of the year, at ſun-riſe, innumerable veſſels loaded with various kinds of flowers and herbs, which are cultivated in thoſe gardens, are ſeen arriving by the canal, at the great market-place of that capital. All plants thrive there ſurpriſingly; the mud of the lake is an extremely fertile ſoil, and requires no water from the clouds. In the largeſt gardens there is commonly a little tree, and even a little hut to ſhelter the cultivator and defend him from rain or the ſun. When the owner of the garden, or the *Chinampa* as he is uſually called, wiſhes to change his ſituation, to remove from a diſagreeable neighbour, or to come nearer to his own family, he gets into his little veſſel, and by his own ſtrength alone if the garden is ſmall, or with the aſſiſtance of others if it is large, he tows if after him, and conducts it wherever he pleaſes with the little tree and hut upon it. That part of the lake where thoſe floating gardens are, is a place of infinite recreation, where the ſenſes receive the higheſt poſſible gratification.

GARDENING;

THE art of planning and cultivating gardens. In its utmoſt extent, whatever contributes to render the ſcenes of nature delightful, is amongſt the ſubjects of gardening; and animate as well as inanimate objects are circumſtances of beauty or character. The whole range of nature is open to the gardener, from the parterre to the foreſt; and whatever is agreeable to the ſenſes or the imigination, he may appropriate to the ſpot he is to improve: it is a part of his buſineſs to collect into one place the delights which are generally diſperſed through different ſpecies of country.

Hiſtory of Gardening.

GARDENING, Mr Walpole * obſerves, was probably one of the firſt arts that ſucceeded to that of building houſes, and naturally attended property and individual poſſeſſion. Culinary, and afterwards medicinal herbs, were the objects of every head of a family: it became convenient to have them within reach, without ſeeking them at random in woods, in meadows, and on mountains, as often as they were wanted. When the earth ceaſed to furniſh ſpontaneouſly all thoſe primitive luxuries, and culture became requiſite, ſeparate incloſures for rearing herbs grew expedient. Fruits were in the ſame predicament; and thoſe moſt in uſe or that demand attention muſt have entered into and extended the domeſtic incloſure. The good man Noah, we are told, planted a vineyard, drank of the wine, and was drunken; and every body knows the conſequences. Thus we acquired kitchen-gardens, orchards, and vinyards. No doubt the prototype of all theſe ſorts was the garden of Eden; but as that Paradiſe was a good deal larger than any we read of afterwards, being incloſed by the rivers Piſon, Gihon, Hiddekel, and Euphrates; as every tree that was pleaſant to the ſight and good for food grew in it; and as two other trees were likewiſe found there, of which not a ſlip or ſucker remains; it does not belong to the preſent diſcuſſion. After the Fall, no man living was ſuffered to enter into the garden; and the poverty and neceſſities of our firſt anceſtors hardly allowed them time to make improvements in their eſtates in imitation of it, ſuppoſing any plan had been preſerved. A cottage and a ſlip of ground for a cabbage and a gooſeberry-buſh, ſuch as we ſee by the ſide of a common, were in all probability the earlieſt ſeats and gardens: a well and bucket ſucceeded to the Piſon and Euphrates. As ſettlements increaſed, the orchard and the vineyard followed; and the earlieſt princes of tribes poſſeſſed juſt the neceſſaries of a modern farmer.

Matters, we may well believe, remained long in this ſituation; and we have reaſon to think that for many centuries the term *garden* implied no more than a kitchen-garden or orchard.

The garden of Alcinous, in the Odyſſey, is the moſt renowned in the heroic times. Is there an admirer of Homer who can read his deſcription without rapture? or who does not form to his imagination a ſcene of delights more pictureſque than the landſcapes of Tinian or Juan Fernandez? "Yet (continues our author) what was that boaſted Paradiſe with which

> the gods ordain'd
> To grace Alcinous and his happy land?

Why, diveſted of harmonious Greek and bewitching poetry, it was a ſmall orchard and vineyard, with ſome beds of herbs and two fountains that watered them, incloſed within a quick-ſet hedge. The whole compaſs of this pompous garden incloſed—four acres:

> Four acres was th' allotted ſpace of ground,
> Fenc'd with a green incloſure all around.

The trees were apples, figs, pomegranates, pears, olives, and vines.

> Tall thriving trees confeſs'd the fruitful mould;
> The red'ning apple ripens into gold.
> Here the blue fig with luſcious juice o'erflows,
> With deeper red the full pomegranate glows.
> The branch here bends beneath the weighty pear,
> And verdant olives flouriſh round the year.
>
> * * * * *
>
> Beds of all various herbs, for ever green,
> In beauteous order terminate the ſcene.

Alcinous's garden was planted by the poet, enriched by him with the fairy gift of eternal ſummer, and no doubt an effort of imagination ſurpaſſing any thing he had ever ſeen. As he has beſtowed on the ſame happy prince a palace with brazen walls and columns of ſilver, he certainly intended that the gardens ſhould be proportionably magnificent. We are ſure, therefore that, as late as Homer's age, an incloſure of four acres, comprehending orchard, vineyard, and kitchen-garden, was a ſtretch of luxury the world at that time had never beheld."

Previous to this, however, we have in the ſacred writings hints of a garden ſtill more luxuriouſly furniſhed. We allude to the Song of Solomon, part of the ſcene of which is undoubtedly laid in a garden †. Flowers and fruits are particularly ſpoken of as the ornaments and the produce of it; and beſides theſe, aromatic vegetables formed a conſiderable part of the gratifications it afforded. The camphor and the cinnamon tree, with all trees of frankincenſe, and all the chief ſpecies, flouriſhed there ‡. Solomon tells us in another place ||, That he made him great works;—gardens and orchards, and planted in them trees of every kind. Indeed we muſt ſuppoſe his gardens to have been both amply and curiouſly furniſhed, ſeeing the kinds, nature, and properties of the vegetable tribes, ſeem to have been a favourite ſtudy with the royal philoſopher, and to have been deemed a ſubject worthy of his pen: for we are told, that he wrote of plants, from the great cedar of Lebanon down to the hyſſop of the wall §. Fountains and ſtreams of water appear alſo to have had a ſhare in the compoſition, and probably for ornament as well as uſe.

The hanging gardens of Babylon, mentioned in a preceeding article, were a ſtill greater prodigy. But as they are ſuppoſed to have been formed on terraces and the walls of the palace, whither ſoil was conveyed on purpoſe, Mr Walpole concludes, "they were what ſumptuous

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* *Hiſt. of Mod. Gardening*, ſubjoined to the 4th vol. of his *Anecdotes of Painting.*

† Chap. ii. 1.

‡ Cant. iv. 12.

|| Eccl. ii. 4, 5.

§ kings iv. 33.

tuous gardens have been in all ages till the preſent, unnatural, enriched by art, poſſibly with fountains, ſtatues, balluſtrades, and ſummer-houſes, and were any thing but verdant and rural."

Others, however, have allowed them greater praiſe. They ſeem, in many reſpects, to have been laid out with good taſte. Their elevation not only produced a variety and extent of view, but was alſo uſeful in moderating the heat. Such a ſituation would likewiſe ſuit a greater variety of trees and plants than a plain ſurface, and would contain a larger as well as a more diverſified extent.

The ſuiting of the ſituation to the nature of the trees ſeems, from the account given by Joſephus, to have been one view* in the erecting the building in ſuch a manner. And the ſucceſs ſeems to have been anſwerable, as the trees are ſaid to have flouriſhed extremely well†, and to have grown as tall as in their native ſituations. On the whole, then, however different theſe may appear from modern gardens, they ſeem to have been formed with judgment and taſte, and well adapted to the ſituation and circumſtances.

It ſeems probable, from ſeveral circumſtances, that the eaſtern gardens were adjoining to the houſe or palace to which they belonged. Thus, king Ahaſuerus goes immediately from the banquent of wine to walk in the garden of the palace‡. The garden of Cyrus, at Sardis, mentioned by Xenophon||, was probably contiguous to the palace; as was that of Attalus, mentioned by Juſtin§. The hanging gardens at Babylon, were not ſo much adjacent to the palace, as a part of the palace itſelf, ſince ſeveral of the royal apartments were beneath them¶.

It is not clear what the taſte for gardening was among the Greeks. The Academus, we know, was a wooded ſhady place; and the trees appear to have been of the olive ſpecies. It was ſituated beyond the limits of the walls, and adjacent to the tombs of the heroes; and though we are no where informed of the particular manner in which this grove was diſpoſed or laid out, it may be gathered from Pauſanias, in his Attica, that it was an elegant ornamented place. At the entrance was an altar dedicated to Love, which was ſaid to be the firſt erected to that Deity. Within the Academus were the altars of Prometheus, of the Muſes, of Mercury, of Minerva, and Hercules; and at a ſmall diſtance was the tomb of Plato. So that, in all probability, it was highly adapted by art, as well as nature, to philoſophic reflection and contemplation.

We are told by Plutarch, that before the time of Cimon, the Academus was a rude and uncultivated ſpot: but that it was planted by that general, and had water conveyed to it; whether this water was brought merely for uſe to refreſh the trees, or for ornament, does not appear. It was divided into gymnaſia, or places of exerciſe, and philoſophic walks, ſhaded with trees. Theſe are ſaid to have flouriſhed very well, until deſtroyed by Sylla (when he beſieged Athens), as well as thoſe in the Lyceum.

Near the academy were the gardens of the philoſophers, of Plato, and of Epicurus; which, however, were probably but ſmall. The ſcene of Plato's Dialogue concerning Beauty is elegantly deſcribed as being on the banks of the river Iliſſus, and under the ſhade of the plantane; but no artificial arrangement of objects is mentioned, nor any thing which will lead us to imagine the proſpect to be any other than merely natural.

Among the Romans, a taſte for gardening, any otherwiſe than as a matter of utility, ſeems not to have prevailed till a very late period; at leaſt the writers on huſbandry, Cato, Varro, Columella, and Palladius, make not the leaſt mention of a garden as an object of pleaſure, but ſolely with reſpect to its productions of herbs and fruits. The Lucullan gardens are the firſt we find mentioned of remarkable magnificence; though probably from the extravagance to which theſe were arrived, they were not the firſt. Plutarch ſpeaks of them as incredibly expenſive, and equal to the magnificence of kings. They contained artificial elevations of ground to a ſurpriſing height, of buildings projected into the ſea, and vaſt pieces of water made upon land. In ſhort, his extravagance and expence were ſo great, that he acquired thence the appellation of the Roman Xerxes. It is not improbable, from the above account, and from the conſideration of Lucullus having ſpent much time in Aſia, in a ſituation wherein he had an opportunity of obſerving the moſt ſplendid conſtructions of this kind, that theſe gardens might be laid out in the Aſiatic ſtyle. The vaſt maſſes of building ſaid to have been erected, might have borne ſome reſemblance, in the arrangement and ſtyle, to the Babylonian gardens; and the epithet of the Roman Xerxes might be applicable to the taſte, as well as to the ſize and expence of his works.

The Tuſculan Villa of Cicero, though often mentioned, is not any where deſcribed in his works, ſo as to give an adequate idea of the ſtyle in which his gardens or grounds were diſpoſed.

There is but little to be traced in Virgil relative to this ſubject. Pines*, it ſeems probable, were a favourite ornament in gardens; and flowers†, roſes eſpecially, were much eſteemed, perfumes indeed having been always highly valued in warm climates. Virgil places Anchiſes in Elyſium, in a grove of bays; and is careful to remark, that they were of the ſweet-ſcented kind. The Pæſtan roſes were chiefly valued for their excellent odour; and the ſame quality appears to be the cauſe why they were placed by Tibullus as ornaments to the Elyſian fields. There appears alſo to have prevailed among the Romans a piece of luxury relative to gardens, which is equally prevalent at preſent among us, namely the forcing of flowers at ſeaſons of the year not ſuited to their natural blowing: and roſes were then, as at preſent, the principal flowers upon which theſe experiments were tried, as appears from Martial ‡ and others.

When Roman authors (Mr Walpole remarks), whoſe climate inſtilled a wiſh for cool retreats, ſpeak of their enjoyments in that kind, they ſigh for grottos, caves, and the refreſhing hollows of mountains, near irriguous and ſhady founts; or boaſt of their porticos, walks of planes, canals, baths, and breezes from the ſea. Their gardens are never mentioned as affording ſhade and ſhelter from the rage of the dog-ſtar. Pliny has left us deſcriptions of two of his villas. As he uſed his Laurentine villa for his winter retreat, it is not ſurpriſing that the garden makes no conſiderable part of the account. All he ſays of it is, that the geſtatio or place of exerciſe, which ſurrounded the garden (the

* *Contra Apion*, l. 1. § 19.

† *Q. Curt*, l. 5.

‡ Eſther vii. 7.

|| *Oecon.*

§ L. 36. c. 4.

¶ *Diod.* l. 2.

* *Eclog.* vii. 65, &c.

† *Geor.* iv. 118.

‡ Vide *Epigr.* l. vi. ep. 80. l. xiv. ep. 127. and *Lampridius in vit. Elegab.*

latter conſequently not being very large), was bounded by a hedge of box, and, where that was periſhed, with roſemary; that there was a walk of vines; and that moſt of the trees were fig and mulberry, the ſoil not being proper for any other ſorts. On his Tuſcan villa he is more diffuſe; the garden makes a conſiderable part of the deſcription:—and what was the principal beauty of that pleaſure-ground? Exactly what was the admiration of this country about threeſcore years ago; box-trees cut into monſters, animals, letters, and the names of the maſter and the artificer. In an age when architecture diſplayed all its grandeur, all its purity, and all its taſte; when aroſe Veſpaſian's amphitheatre, the temple of Peace, Trajan's forum, Domitian's baths, and Adrian's villa, the ruins and veſtiges of which ſtill excite our aſtoniſhment and curioſity; a Roman conſul, a poliſhed emperor's friend, and a man of elegant literature and taſte, delighted in what the mob now ſcarce admire in a college-garden. All the ingredients of Pliny's correſponded exactly with thoſe laid out by London and Wiſe on Dutch principles. He talks of ſlopes, terraces, a wilderneſs, ſhrubs methodically trimmed, a marble baſon, pipes ſpouting water, a caſcade falling into the baſon, bay-trees alternately planted with planes, and a ſtraight walk from whence iſſued others parted off by hedges of box and apple-trees, with obeliſks placed between every two. There wants nothing but the embroidery of a parterre, to make a garden in the reign of Trajan ſerve for a deſcription of one in that of king William. In one paſſage above, Pliny ſeems to have conceived that natural irregularity might be a beauty; *in opere urbaniſſimo*, ſays he, *ſubita velut illati ruris imitatio*. Something like a rural view was contrived amidſt ſo much poliſhed compoſition. But the idea ſoon vaniſhed, lineal walks immediately enveloped the ſlight ſcene, and names and inſcriptions in box again ſucceeded to compenſate for the daring introduction of nature.

In the paintings found at Herculaneum are a few traces of gardens, as may be ſeen in the ſecond volume of the prints. They are ſmall ſquare incloſures, formed by trellis-work and eſpaliers, and regularly ornamented with vaſes, fountains, and careatides, elegantly ſymmetrical, and proper for the narrow ſpaces allotted to the garden of a houſe in a capital city.

From what has ben ſaid, it appears how naturally and inſenſibly the idea of a kitchen-garden ſlid into that which has for ſo many ages been peculiarly termed a *garden*, and by our anceſtors diſtinguiſhed by the name of a *pleaſure-garden*. A ſquare piece of ground was originally parted off in early ages for the uſe of the family:—to exclude cattle, and aſcertain the property, it was ſeparated from the fields by a hedge. As pride and deſire of privacy increaſed, the incloſure was dignified by walls; and in climes where fruits were not laviſhed by the ripening glow of nature and ſoil, fruit-trees were aſſiſted and ſheltered from ſurrounding winds by the like expedient; for the inundation of luxuries, which have ſwelled into general neceſſities, have almoſt all taken their ſource from the ſimple foundation of reaſon.

When the cuſtom of making ſquare gardens incloſed with walls was thus eſtabliſhed to the excluſion of nature and proſpect, pomp and ſolitude combined to call for ſomething that might enrich and enliven the inſipid and unanimated partition. Fountains, firſt invented for uſe, which grandeur loves to diſguiſe and throw out of the queſtion, received embelliſhments from coſtly marbles, and at laſt, to contradict utility, toſſed their waſte of waters into air in ſpouting columns. Art, in the hands of rude man, had at firſt been made a ſuccedaneum to nature; in the hands of oſtentatious wealth, it became the means of oppoſing nature; and the more it traverſed the march of the latter, the more nobility thought its power was demonſtrated. Canals meaſured by the line were introduced in lieu of meandering ſtreams, and terraces were hoiſted aloft in oppoſition to the facile ſlopes that imperceptibly unite the valley to the hill. Baluſtrades defended theſe precipitate and dangerous elevations, and flights of ſteps rejoined them to the ſubjacent flat from which the terrace had been dug. Vaſes and ſculpture were added to theſe unneceſſary balconies, and ſtatues furniſhed the lifeleſs ſpot with mimic repreſentations of the excluded ſons of men. Thus difficulty and expence were the conſtituent parts of thoſe ſumptuous and ſelfiſh ſolitudes; and every improvement that was made, was but a ſtep farther from nature. The tricks of waterworks to wet the unwary, not to refreſh the panting ſpectator, and parterres embroidered in patterns like a petticoat, were but the childiſh endeavours of faſhion and novelty to reconcile greatneſs to what it had ſurfeited on. To crown theſe impotent diſplays of falſe taſte, the ſheers were applied to the lovely wildneſs of form with which nature has diſtinguiſhed each various ſpecies of tree and ſhrub. The venerable oak, the romantic beech, the uſeful elm, even the aſpiring circuit of the lime, the regular round of the cheſnut, and the almoſt moulded orange-tree, were corrected by ſuch fantaſtic admirers of ſymmetry. The compaſs and ſquare were of more uſe in plantations than the nurſery-man. The meaſured walk, the quincunx, and the etoile, impoſed their unſatisfying ſameneſs on every royal and noble garden. Trees were headed, and their ſides pared away; many French groves ſeem green cheſts ſet upon poles. Seats of marble, arbours, and ſummer-houſes, terminated every viſta; and ſymmetry, even where the ſpace was too large to permit its being remarked at one view, was ſo eſſential, that, as Pope obſerved,

——each alley has a brother,
And half the garden juſt reflects the other.

Knots of flowers were more defenſibly ſubjected to the ſame regularity. Leiſure, as Milton expreſſed it,

——in trim gardens took his pleaſure.

In the garden of Marſhal de Biron at Paris, conſiſting of 14 acres, every walk is buttoned on each ſide by lines of flower-pots, which ſucceed in their ſeaſons.

It does not preciſely appear what our anceſtors meant by a bower: It was probably an arbour; ſometimes it meant the whole frittered incloſure, and in one inſtance it certainly included a labyrinth. Roſamond's bower was indiſputably of that kind; though whether compoſed of walls or hedges, we cannot determine. A ſquare and a round labyrinth were ſo capital ingredients of a garden formerly, that in Du Cerceau's architecture, who lived in the time of Charles IX. and Henry III. there is ſcarce a ground-plot without one of each.

In Kip's Views of the Seats of our Nobility and Gentry, we ſee the ſame tireſome and returning uniformity. Every houſe is approached by two or three gardens, conſiſting perhaps of a gravel-walk and two graſs-plats or borders of flowers. Each riſes above the other by two or three ſteps, and as many walls and terraces, and ſo many iron gates, that we recollect thoſe ancient romances in which every entrance was guarded by nymphs or dragons. Yet though theſe and ſuch prepoſterous inconveniences prevailed from age to age, good ſenſe in this country had perceived the want of ſomething at once more grand and more natural. Theſe reflections, and the bounds ſet to the waſte made by royal ſpoilers, gave origin to Parks. They were contracted foreſts, and extended gardens. Hentzner ſays, that, according to Rous of Warwick, the firſt park was that at Woodſtock. If ſo, it might be the foundation of a legend that Henry II. ſecured his miſtreſs in a labyrinth: it was no doubt more difficult to find her in a park than in a palace, where the intricacy of the woods and various lodges buried in covert might conceal her actual habitation.

It is more extraordinary that, having ſo long ago ſtumbled on the principle of modern gardening, we ſhould have perſiſted in retaining its reverſe, ſymmetrical and unnatural gardens. That parks were rare in other countries, Hentzner, who travelled over great part of Europe, leads us to ſuppoſe, by obſerving that they were common in England. In France they retain the name, but nothing is more different both in compaſs and diſpoſition. Their parks are uſually ſquare or oblong incloſures, regularly planted with walks of cheſnuts or limes, and generally every large town has one for its public recreation.

"One man, one great man we had (continues Mr Walpole), on whom nor education nor cuſtom could impoſe their prejudices; who, 'on evil day though fallen, and with darkneſs and ſolitude compaſſed round,' judged that the miſtaken and fantaſtic ornaments he had ſeen in gardens, were unworthy of the Almighty hand that planted the delights of Paradiſe. He ſeems with the prophetic eye of taſte to have conceived, to have foreſeen modern gardening; as Lord Bacon announced the diſcoveries ſince made by experimental philoſophy. The deſcription of Eden is a warmer and more juſt picture of the preſent ſtyle than Claud Lorrain could have painted from Hagley or Stourhead. The firſt lines we ſhall quote exhibit Stourhead on a more magnificent ſcale;

> Thro' Eden went a river large,
> Nor chang'd his courſe, but thro' the ſhaggy hill
> Paſs'd underneath ingulph'd; for God had thrown
> That mountain as his garden mound, high rais'd
> Upon the rapid current——

Hagley ſeems pictured in what follows:

> Which thro' veins
> Of porous earth with kindly thirſt updrawn,
> Roſe a freſh fountain, and with many a rill
> Water'd the garden——

What colouring, what freedom of pencil, what landſcape in theſe lines!

> ——from that ſaphire fount the criſped brooks,
> Rolling on orient pearl and ſands of gold,
> With mazy error under pendent ſhades,
> Ran nectar, viſiting each plant, and fed
> Flower's worthy of Paradiſe, which not nice art
> In beds and curious knots, but *nature* boon
> Pour'd forth profuſe on hill and dale and plain,
> Both where the morning ſun firſt warmly ſmote
> The *open field*, and where the impierc'd ſhade
> Imbrown'd the noon-tide bow'rs—*Thus was this place*
> *A happy rural ſeat of various view.*

Read this tranſporting deſcription, paint to your mind the ſcenes that follow, contraſt them with the ſavage but reſpectable terror with which the poet guards the bounds of his paradiſe, fenced

> ——with the champaign head
> Of a ſteep wilderneſs, whoſe hairy ſides
> With thicket overgrown, groteſque and wild,
> Acceſs denied; and over head up grew
> Inſuperable height of loftieſt ſhade,
> Cedar and pine, and fir, and branching palm,
> A ſylvan ſcene, and, as the ranks aſcend,
> Shade above ſhade, a woody theatre,
> Of ſtatelieſt view——

and then recollect, that the author of this ſublime viſion had never ſeen a glimpſe of any thing like what he has imagined; that his favourite ancients had dropped not a hint of ſuch divine ſcenery; and that the conceits in Italian gardens, and Theobalds and Nonſuch, were the brighteſt originals that his memory could furniſh. His intellectual eye ſaw a nobler plan, ſo little did he ſuffer by the loſs of ſight. It ſufficed him to have ſeen the materials with which he could work. The vigour of a boundleſs imagination told him how a plan might be diſpoſed, that would embelliſh nature, and reſtore art to its proper office, the juſt improvement or imitation of it.

"Now let us turn to an admired writer, poſterior to Milton, and ſee how cold, how inſipid, how taſteleſs is his account of what he pronounced a perfect garden. We ſpeak not of his ſtyle, which it was not neceſſary for him to animate with the colouring and glow of poetry. It is his want of ideas, of imagination, of taſte, that deſerve cenſure, when he dictated on a ſubject that is capable of all the graces that a knowledge of beautiful nature can beſtow. Sir William Temple was an excellent man; Milton, a genius of the firſt order.

"We cannot wonder that Sir William declares in favour of parterres, fountains, and ſtatues, as neceſſary to break the ſameneſs of large graſs-plats, which he thinks have an ill effect upon the eye, when he acknowledges that he diſcovers fancy in the gardens of Alcinous. Milton ſtudied the ancients with equal enthuſiaſm, but no bigotry; and had judgment to diſtinguiſh between the want of invention and the beauties of poetry. Compare his paradiſe with Homer's garden, both aſcribed to a celeſtial deſign. For Sir William, it is juſt to obſerve, that his ideas centered in a fruit-garden. He had the honour of giving to his country many delicate fruits, and he thought of little elſe than diſpoſing them to the beſt advantage.

'The beſt figure of a garden (ſays he) is either a ſquare or an oblong, and either upon a flat or a deſcent: they have all their beauties, but the beſt I eſteem an oblong upon a deſcent. The beauty, the air, the view, make amends for the expence, which is very great in finiſhing and ſupporting the terrace-walk, in levelling the parterres, and in the ſtone-ſtairs that are neceſſary from one to the other. The perfecteſt figure of a garden I ever ſaw, either at home or abroad, was that of Moor-park in Hertfordſhire, when I knew it about 30 years ago. It was made by the Counteſs of Bedford, eſteemed among the greateſt wits of her time, and celebrated by Dr Donne; and with very great care, excellent contrivance, and much coſt; but greater ſums may be thrown away without effect or honour, if there want ſenſe in proportion to money, or

‘ if nature be not followed ;’ which I take to be the great rule in this, and perhaps in every thing elſe, as far as the conduct not only of our lives but our governments.’ [We ſhall ſee how natural that admired garden was.] ‘ Becauſe I take the garden I have named to have been in all kinds the moſt beautiful and perfect, at leaſt in the figure and diſpoſition, that I ever have ſeen, I will deſcribe it for a model to thoſe that meet with ſuch a ſituation, and are above the regards of common expence. It lies on the ſide of a hill, upon which the houſe ſtands, but not very ſteep. The length of the houſe, where the beſt rooms and of moſt uſe or pleaſure are, lies upon the breadth of the garden ; the great parlour opens into the middle of a terrace gravel-walk that lies even with it, and which may lie, as I remember, about 300 paces long, and broad in proportion ; the border ſet with ſtandard laurels and at large diſtances, which have the beauty of orange-trees out of flower and fruit. From this walk are three deſcents by many ſtone-ſteps, in the middle and at each end, into a very large parterre. This is divided into quarters by gravel-walks, and adorned with two fountains and eight ſtatues in the ſeveral quarters. At the end of the terrace-walk are two ſummer-houſes, and the ſides of the parterre are ranged with two large cloiſters, open to the garden, upon arches of ſtone, and ending with two other ſummer-houſes even with the cloiſters, which are paved with ſtone, and deſigned for walks of ſhade, there being none other in the whole parterre. Over theſe two cloiſters are two terraces covered with lead and fenced with baluſters ; and the paſſage into theſe airy walks is out of the two ſummer-houſes at the end of the firſt terrace-walk. The cloiſter facing the ſouth is covered with vines, and would have been proper for an orange-houſe, and the other for myrtles or other more common greens, and had, I doubt not, been caſt for that purpoſe, if this piece of gardening had been then in as much vogue as it is now. From the middle of this parterre is a deſcent by many ſteps flying on each ſide of the grotto that lies between them, covered with lead and flat, into the lower garden, which is all fruit-trees ranged about the ſeveral quarters of a wilderneſs, which is very ſhady ; the walks here are all green, the grotto embelliſhed with figures of ſhell rock-work, fountains, and water-works. If the hill had not ended with the lower garden, and the wall were not bounded by a common way that goes through the park, they might have added a third quarter of all greens ; but this want is ſupplied by a garden on the other ſide the houſe, which is all of that ſort, very wild, ſhady, and adorned with rough rock-work and fountains. This was Moor-park when I was acquainted with it, and the ſweeteſt place, I think, that I have ſeen in my life, either before or ſince, at home or abroad.’

“ It is unneceſſary to add any remarks on this deſcription. Any man might deſign and build as ſweet a garden, who had been born in and never ſtirred out of Holborn. It was not, however, peculiar to Sir William Temple to think in that manner. How many Frenchmen are there who have ſeen our gardens, and ſtill prefer natural flights of ſteps and ſhady cloiſters covered with lead ! Le Nautre, the architect of the groves and grottos at Verſailles, came hither on a miſſion to improve our taſte. He planted St James's and Greenwich Parks—no great monuments of his invention.

“ To do farther juſtice to Sir William Temple, we muſt not omit what he adds. ‘ What I have ſaid of the beſt forms of gardens is meant only of ſuch as are in ſome ſort regular ; for there may be other forms wholly irregular, that may, for aught I know, have more beauty than any of the others ; but they muſt owe it to ſome extraordinary diſpoſitions of nature in the ſeat, or ſome great race of fancy or judgment in the contrivance, which may reduce many diſagreeing parts into ſome figure, which ſhall yet, upon the whole, be very agreeable. Something of this I have ſeen in ſome places, but heard more of it from others, who have lived much among the Chineſe, a people whoſe way of thinking ſeems to lie as wide of ours in Europe as their country does. Their greateſt reach of imagination is employed in contriving figures, where the beauty ſhall be great and ſtrike the eye, but without any order or diſpoſition of parts, that ſhall be commonly or eaſily obſerved. And though we have hardly any notion of this ſort of beauty, yet they have a particular word to expreſs it ; and when they find it hit their eye at firſt ſight, they ſay the Sharawadgi is fine or is admirable, or any ſuch expreſſion of eſteem : but I ſhould hardly adviſe any of theſe attempts on the figure of gardens among us ; they are adventures of too hard atchievement for any common hands ; and though there may be more honour if they ſucceed well, yet there is more diſhonour if they fail, and it is twenty to one they will ; whereas in regular figures it is hard to make any great and remarkable faults.’

“ Fortunately Kent and a few others were not quite ſo timid, or we might ſtill be going up and down ſtairs in the open air. It is true, we have heard much lately, as Sir William Temple did, of irregularity and imitations of nature in the gardens or grounds of the Chineſe. The former is certainly true : they are as whimſically irregular, as European gardens are formally uniform and unvaried :—but with regard to nature, it ſeems as much avoided, as in the ſquares and oblongs and ſtraight lines of our anceſtors. An artificial perpendicular rock ſtarting out of a flat plain, and connected with nothing, often pierced through in various places with oval hollows, has no more pretenſion to be deemed natural than a lineal terrace or a parterre.’ The late Mr Joſeph Spence, who had both taſte and zeal for the preſent ſtyle, was ſo perſuaded of the Chineſe Emperor's pleaſure-ground being lain out on principles reſembling ours, that he tranſlated and publiſhed, under the name of Sir Harry Beaumount, a particular account of that incloſure from the collection of the Letters of the Jeſuits. But except a determined irregularity, one can find nothing in it that gives any idea of attention being paid to nature. It is of vaſt circumference, and contain 200 palaces, beſides as many contiguous for the eunuchs, all gilt, painted, and varniſhed. There are raiſed hills from 20 to 60 feet high, ſtreams and lakes, and one of the latter five miles round. Theſe waters are paſſed by bridges :—but even their bridges muſt not be ſtraight—they ſerpentize as much as the rivulets, and are ſometimes ſo long as to be furniſhed with reſting-places, and begin and end with triumphal arches. The colonades undulate in the ſame manner. In ſhort, this pretty gaudy ſcene is the work of caprice and whim, and, when we reflect on their buildings, preſents no image but that of unſubſtantial tawdrineſs. Nor is this all. Within this fantaſtic Paradiſe is a ſquare town, each ſide a mile long. Here the eunuchs of the court, to entertain his imperial majeſty with the buſtle and buſineſs of the capital in which he reſides, but which it is not of his dignity ever to ſee, act merchants and all ſorts of trades, and even deſignedly exerciſe for his royal amuſement every art of knavery that is practiſed under his auſpicious government. Methinks this is the childiſh ſolace and repoſe of grandeur, not a retirement from affairs to the delights of rural life. Here too his majeſty plays at agriculture: there is a quarter ſet apart for that purpoſe; the eunuchs ſow, reap, and carry in their harveſt, in the imperial preſence; and his majeſty returns to Pekin, perſuaded that he has been in the country.

“ Having thus cleared our way by aſcertaining what have been the ideas on gardening in all ages, as far as we have materials to judge by, it remains to ſhow to what degree Mr Kent invented the new ſtyle, and what hints he had received to ſuggeſt and conduct his undertaking.

“ We have ſeen what Moor-park was, when pronounced a ſtandard. But as no ſucceeding generation in an opulent and luxurious country contents itſelf with the perfection eſtabliſhed by its anceſtors, more perfect perfection was ſtill ſought; and improvements had gone on, till London and Wiſe had ſtocked all our gardens with giants, animals, monſters, coats of arms, and mottos, in yew, box, and holly. Abſurdity could go no farther, and the tide turned. Bridgman, the next faſhionable deſigner of gardens, was far more chaſte; and whether from good ſenſe, or that the nation had been ſtruck and reformed by the admirable paper in the Guardian, N° 173, he baniſhed verdant ſculpture, and did not even revert to the ſquare preciſion of the foregoing age. He enlarged his plans, diſdained to make every diviſion tally to its oppoſite; and though he ſtill adhered much to ſtraight walks with high clipped hedges, they were only his great lines; the reſt he diverſified by wilderneſs, and with looſe groves of oak, though ſtill within ſurrounding hedges. As his reformation gained footing, he ventured, in the royal garden at Richmond, to introduce cultivated fields, and even morſels of a foreſt appearance, by the ſides of thoſe endleſs and tireſome walks that ſtretched out of one into another without intermiſſion. But this was not till other innovators had broke looſe too from rigid ſymmetry.

“ But the capital ſtroke, the leading ſtep to all that has followed, was the deſtruction of walls for boundaries, and the invention of foſſes—an attempt then deemed ſo aſtoniſhing, that the common people called them Ha! Ha's! to expreſs their ſurpriſe at finding a ſudden and unperceived check to their walk.

“ A ſunk fence may be called the *leading ſtep*, for theſe reaſons. No ſooner was this ſimple enchantment made, than levelling, mowing, and rolling, followed. The contiguous ground of the park without the ſunk fence was to be harmonized with the lawn within; and the garden in its turn was to be ſet free from its prim regularity, that it might aſſort with the wilder country without. The ſunk fence aſcertained the ſpecific garden; but that it might not draw too obvious a line of diſtinction between the neat and the rude, the contiguous out-lying parts came to be included in a kind of general deſign; and when nature was taken into the plan, under improvements, every ſtep that was made pointed out new beauties, and inſpired new ideas. At that moment appeared Kent, painter enough to taſte the charms of landſcape, bold, and opinionative enough to dare and to dictate, and born with a genius to ſtrike out a great ſyſtem from the twilight of imperfect eſſays. He leaped the fence, and ſaw that all nature was a garden. He felt the delicious contraſt of hill and valley changing imperceptibly into each other, taſted the beauty of the gentle ſwell or concave ſcoop, and remarked how looſe groves crowned an eaſy eminence with happy ornament; and while they called in the diſtant view between their graceful ſtems, removed and extended the perſpective by deluſive compariſon.

“ Thus the pencil of his imagination beſtowed all the arts of landſcape on the ſcenes he handled. The great principles on which he worked were perſpective, and light and ſhade. Groupes of trees broke too uniform or too extenſive a lawn; evergreens and woods were oppoſed to the glare of the champaign; and where the view was leſs fortunate, or ſo much expoſed as to be beheld at once, he blotted out ſome parts by thick ſhades to divide it into variety, or to make the richeſt ſcene more enchanting by reſerving it to a farther advance of the ſpectator's ſtep. Thus, ſelecting favourite objects, and veiling deformities by ſcreens of plantation; ſometimes allowing the rudeſt waſte to add its ſoil to the richeſt theatre: he realiſed the compoſitions of the greateſt maſters in painting. Where objects were wanting to animate his horizon, his taſte as an architect could beſtow immediate termination. His buildings, his ſeats, his temples, were more the works of his pencil than of his compaſſes. We owe the reſtoration of Greece and the diffuſion of architecture to his ſkill in landſcape.

“ But of all the beauties he added to the face of this beautiful country, none ſurpaſſed his management of water. Adieu to canals, circular baſons, and caſcades tumbling down marble ſteps, that laſt abſurd magnificence of Italian and French villas. The forced elevation of cataracts was no more. The gentle ſtream was taught to ſerpentize ſeemingly at its pleaſure; and where diſcontinued by different levels, its courſe appeared to be concealed by thickets properly interſperſed, and glittered again at a diſtance where it might be ſuppoſed naturally to arrive. Its borders were ſmoothed, but preſerved their waving irregularity. A few trees ſcattered here and there on its edges ſprinkled the tame bank that accompanied its meanders; and when it diſappeared among the hills, ſhades deſcending from the heights leaned towards its progreſs, and framed the diſtant point of light under which it was loſt, as it turned aſide to either hand of the blue horizon.

“ Thus, dealing in none but the colours of nature, and catching its moſt favourable features, men ſaw a new creation opening before their eyes. The living landſcape was chaſtened or poliſhed, not transformed.

Freedom was given to the forms of trees: they extended their branches unreſtricted; and where any eminent oak, or maſter beech, had eſcaped maiming and ſurvived the foreſt, buſh and bramble was removed, and all its honours were reſtored to diſtinguiſh and ſhade the plain. Where the united plumage of an ancient wood extended wide its undulating canopy, and ſtood venerable in its darkneſs, Kent thinned the foremoſt ranks, and left but ſo many detached and ſcattered trees, as ſoftened the approach of gloom, and blended a chequered light with the thus lengthened ſhadows of the remaining columns.

"Succeeding artiſts have added new maſter-ſtrokes to theſe touches; perhaps improved or brought to perfection ſome that have been named. The introduction of foreign trees and plants, which we owe principally to Archibald Duke of Argyle, contributed eſſentially to the richneſs of colouring ſo peculiar to our modern landſcape. The mixture of various greens, the contraſt of forms between our foreſt-trees and the northern and Weſt Indian firs and pines, are improvements more recent than Kent, or but little known to him. The weeping willow, and every florid ſhrub, each tree of delicate or bold-leaf, are new tints in the compoſition of our gardens.

"But juſt as the encomiums are that have been beſtowed on Kent's diſcoveries, he was neither without aſſiſtance or faults. Mr Pope undoubtedly contributed to form his taſte. The deſign of the Prince of Wales's garden at Carlton-houſe was evidently borrowed from the Poet's at Twickenham. There was a little of affected modeſty in the latter, when he ſaid, of all his works he was moſt proud of his garden. And yet it was a ſingular effort of art and taſte to impreſs ſo much variety and ſcenery on a ſpot of five acres. The paſſing through the gloom from the grotto to the opening day, the retiring and again aſſembling ſhades, the duſky groves, the larger lawn, and the ſolemnity of the termination at the cypreſſes that lead up to his mother's tomb, are managed with exquiſite judgment; and though Lord Peterborough aſſiſted him

> To form his quincunx and to rank his vines,

thoſe were not the moſt pleaſing ingredients of his little perſpective.

"Having routed profeſſed art (for the modern gardener exerts his talents to conceal his art), Kent, like other reformers, knew not how to ſtop at the juſt limits. He had followed Nature, and imitated her ſo happily, that he began to think all her works were equally proper for imitation. In Kenſington garden he planted dead trees, to give a greater air of truth to the ſcene—but he was ſoon laughed out of this exceſs. His ruling principle was, that nature abhors a ſtraight line. His mimics, for every genius has his apes, ſeemed to think that ſhe could love nothing but what was crooked. Yet ſo many men of taſte of all ranks devoted themſelves to the new improvements, that it is ſurpriſing how much beauty has been ſtruck out, with how few abſurdities. Still in ſome lights the reformation ſeems to have been puſhed too far. Though an avenue croſſing a park or ſeparating a lawn, and intercepting views from the ſeat to which it leads, are capital faults; yet a great avenue cut through woods, perhaps before entering a park, has a noble air, and

> Like footmen running before coaches
> To tell the inn what lords approaches,

announces the habitation of ſome man of diſtinction. In other places the total baniſhment of all particular neatneſs immediately about a houſe, which is frequently left gazing by itſelf in the middle of a park, is a defect. Sheltered and even cloſe walks, in ſo very uncertain a climate as ours, are comforts ill exchanged for the few pictureſque days that we enjoy; and when ever a family can purloin a warm and even ſomething of an old-faſhioned garden from the landſcape deſigned for them by the undertaker in faſhion, without interfering with the picture, they will find ſatisfactions on thoſe days that do not invite ſtrangers to come and ſee their improvements."

Part I. PRINCIPLES of GARDENING.

GARDENING, in the perfection to which it has been lately brought in Britain, is intitled to a place of conſiderable rank among the liberal arts. It is (ſays Mr Wheatley) as ſuperior to landſcape-painting as a reality to a repreſentation: it is an exertion of fancy; a ſubject for taſte; and being releaſed now from the reſtraints of regularity, and enlarged beyond the purpoſes of domeſtic convenience, the moſt beautiful, the moſt ſimple, the moſt noble ſcenes of nature, are all within its province. For it is no longer confined to the ſpots from which it takes its name; but, as already obſerved, regulates alſo the diſpoſition and embelliſhments of a park, a farm, a foreſt, &c. and the buſineſs of a gardener is to ſelect and apply whatever is great, elegant, or characteriſtic, in any of them to diſcover, and to ſhow all the advantages of the place upon which he is employed; to ſupply its defects, to correct its faults, and to improve its beauties.

Sect. I. I *Materials of Gardening.*

These may be divided into two general claſſes; *Natural* and *Factitious*

§ 1. *Of the Natural Materials.*

These, according to Mr Wheatley's enumeration, are: Ground, Wood, Water, and Rocks.

I. GROUND. By this is meant that portion of naked ſurface which is included within the place to be improved; whether that ſurface be ſwamp, lawn, roughet, or broken ground; and whether it be a height, a valley, a plain, or a compoſition of ſwells, dips, and levels.

The following paſſage has been quoted from Mr Gilpin's obſervations on the Wye *, as affording a ſublime idea of what ground ought to be.—"Nothing (ſays he) gives ſo juſt an idea of the beautiful ſwellings of ground as thoſe of water, where it has

* P 62.

has ſufficient room to undulate and expand. In ground which is compoſed of very refractory materials, you are preſented often with harſh lines, angular inſertions, and diſagreeable abruptneſſes. In water, whether in gentle or in agitated motion, all is eaſy, all is ſoftened into itſelf; and the hills and the valleys play into each other in a variety of the moſt beautiful forms. In agitated water, abruptneſſes indeed there are, but yet they are ſuch abruptneſſes as in ſome part or other unite properly with the ſurface around them; and are on the whole peculiarly harmonious. Now, if the ocean in any of theſe ſwellings and agitations could be arreſted and fixed, it would produce that pleaſing variety which we admire in ground. Hence it is common to fetch our images from water, and apply them to land: we talk of an undulating line, a playing lawn, and a billowy ſurface; and give a much ſtronger and more adequate idea of ſuch imagery, than plain language could poſſibly preſent."

The exertions of art, however, are here inadequate; and the artiſt ought not attempt to create a mountain, a valley, or a plain: he ſhould but rarely meddle even with the ſmaller inequalities of grounds. Roughets and broken ground may generally be reduced to lawn, or hid with wood; and a ſwamp may be drained or covered with water; whilſt lawn may be variegated at pleaſure by wood, and ſometimes by water.

II. WOOD, as a general term, comprehends all trees and ſhrubs in whatever diſpoſition; but it is ſpecifically applied in a more limited ſenſe, and in that ſenſe we ſhall now uſe it.

Every plantation muſt be either a *wood*, a *grove*, or a *clump*. A wood is compoſed both of trees and underwood, covering a conſiderable ſpace. A grove conſiſts of trees without underwood. A clump differs from either only in extent: it may be either cloſe or open: when cloſe, it is ſometimes called a *thicket*; when open, a *groupe of trees*; but both are equally clumps, whatever may be the ſhape or ſituation.

1
Of the ſurface of a wood.

1. One of the nobleſt objects in nature (Mr Wheatley obſerves) is the *ſurface of a large thick wood*, commanded from an eminence, or ſeen from below hanging on the ſide of a hill. The latter is generally the more intereſting object. Its aſpiring ſituation gives it an air of greatneſs; its termination is commonly the horizon: and, indeed, if it is deprived of that ſplendid boundary, if the brow appears above it (unleſs ſome very peculiar effect characteriſes that brow), it loſes much of its magnificence: it is inferior to a wood which covers a leſs hill from the top to the bottom; for a whole ſpace filled is ſeldom little. But a wood commanded from an eminence is generally no more than a part of the ſcene below; and its boundary is often inadequate to its greatneſs. To continue it, therefore, till it winds out of ſight, or loſes itſelf in the horizon, is generally deſirable: but then the varieties of its ſurface grow confuſed as it retires; while thoſe of a hanging wood are all diſtinct, the furtheſt parts are held up to the eye, and none are at a diſtance though the whole be extenſive.

The varieties of a ſurface are eſſential to the beauty of it: a continued ſmooth ſhaven level of foilage is neither agreeable nor natural; the different growths of trees commonly break it in reality, and their ſhadows ſtill more in appearance. Theſe ſhades are ſo many tints, which, undulating about the ſurface, are its greateſt embelliſhment; and ſuch tints may be produced with more effect, and more certainty, by a judicious mixture of greens; at the ſame time an additional variety may be introduced, by grouping and contraſting trees very different in ſhape from each other; and whether variety in the greens or in the forms be the deſign, the execution is often eaſy, and ſeldom to a certain degree impoſſible. In raiſing a young wood, it may be perfect. In old woods, there are many ſpots which may be either thinned or thickened: and their the characteriſtic diſtinctions ſhould determine what to plant, or which to leave; at the leaſt will often point out thoſe which, as blemiſhes, ought to be taken away; and the removal of two or three trees will ſometimes accompliſh the deſign. The number of beautiful forms, and agreeable maſſes, which may decorate the ſurface, is ſo great, that where the place will not admit of one, another is always ready: and as no delicacy of finiſhing is required, no minute exactneſs is worth regarding; great effects will not be diſconcerted by ſmall obſtructions and little diſappointments.

The contraſts, however, of maſſes and of groupes muſt not be too ſtrong, where *greatneſs* is the character of the wood; for unity is eſſential to greatneſs: and if direct oppoſites be placed cloſe together, the wood is no longer one object; it is only a confuſed collection of ſeveral ſeparate plantations. But if the progreſs be gradual from the one to the other, ſhapes and tints widely different may aſſemble on the ſame ſurface; and each ſhould occupy a conſiderable ſpace: a ſingle tree, or a ſmall cluſter of trees, in the midſt of an extenſive wood, is in ſize but a ſpeck, and in colour but a ſpot; the groupes and the maſſes muſt be large to produce any ſenſible variety.

When, in a romantic ſituation, very broken ground is overſpread with wood, it may be proper on the ſurface of the wood to mark the inequalities of the ground. *Rudeneſs*, not greatneſs, is the prevailing idea; and a choice directly the reverſe of that which is productive of unity, will produce it. Strong contraſts, even oppoſitions, may be eligible; the aim is rather to disjoint than to connect: a deep hollow may ſink into dark greens; an abrupt bank may be ſhown by a riſing ſtage of aſpiring trees, a ſharp ridge by a narrow line of conical ſhapes: firs are of great uſe upon ſuch occaſions; their tint, their form, their ſingularity, recommend them.

A hanging *wood of thin foreſt-trees*, and ſeen from below, is ſeldom pleaſing: thoſe few trees are by the perſpective brought nearer together; it loſes the beauty of a thin wood, and is defective as a thick one: the moſt obvious improvement, therefore, is to thicken it. But, when ſeen from an eminence, a thin wood is often a lively and elegant circumſtance in a view; it is full of objects; and every ſeparate tree ſhows its beauty. To increaſe that vivacity, which is the peculiar excellence of a thin wood, the trees ſhould be characteriſtically diſtinguiſhed both in their tints and their ſhapes; and ſuch as for their airineſs have been proſcribed in a thick wood, are frequently the moſt eligible here. Differences alſo in their growths are a further ſource of variety; each ſhould be conſidered as a diſtinct object, unleſs where a ſmall number are grouped together ; and then all that compoſe the little cluſter muſt agree : but the groupes themſelves, for the ſame reaſon as the ſeparate trees, ſhould be ſtrongly contraſted ; the continued underwood is their only connection, and that is not affected by their variety.

2
Of the outline of a wood.

Though the ſurface of a wood, when commanded, deſerves all theſe attentions, yet the *outline* more frequently calls for our regard : it is alſo more in our power ; it may ſometimes be great, and may always be beautiful. The firſt requiſite is irregularity. That a mixture of trees and underwood ſhould form a long ſtraight line, can never be natural ; and a ſucceſſion of eaſy ſweeps and gentle rounds, each a portion of a greater or leſs circle, compoſing all together a line literally ſerpentine, is, if poſſible, worſe. It is but a number of regularities put together in a diſorderly manner, and equally diſtant from the beautiful both of art and of nature. The true beauty of an outline conſiſts more in breaks than in ſweeps ; rather in angles than in rounds ; in variety, not in ſucceſſion.

Every variety in the outline of a wood muſt be a *prominence* or a *receſs*. Breadth in either is not ſo important as length to the one and depth to the other. If the former ends in an angle, the latter diminiſhes to a point ; they have more force than a ſhallow dent, or a dwarf excreſcence, how wide ſoever. They are greater deviations from the continued line which they are intended to break ; and their effect is to enlarge the wood itſelf, which ſeems to ſtretch from the moſt advanced point, back beyond the moſt diſtant to which it retires. The extent of a large wood on a flat, not commanded, can by no circumſtance be ſo manifeſtly ſhown as by a deep receſs ; eſpecially if that receſs wind ſo as to conceal the extremity, and leave the imagination to purſue it. On the other hand, the poverty of a ſhallow wood might ſometimes be relieved by here and there a prominence, or clumps which by their apparent junction ſhould ſeem to be prominences from it. A deeper wood with a continued outline, except when commanded, would not appear ſo conſiderable.

Wheatley's Obſervat. on Modern Gardening.

An inlet into a wood ſeems to have been cut, if the oppoſite points of the entrance tally ; and that ſhow of art depreciates its merit : but a difference only in the ſituation of thoſe points, by bringing one more forward than the other, prevents the appearance, though their forms be ſimilar. Other points, which diſtinguiſh the great parts, ſhould in general be ſtrongly marked : a ſhort turn has more ſpirit in it than a tedious circuity ; and a line broken by angles has a preciſion and firmneſs, which in an undulated line are wanting ; the angles ſhould indeed commonly be a little ſoftened ; the rotundity of the plant which forms them is ſometimes ſufficient for the purpoſe ; but if they are mellowed down too much, they loſe all meaning. Three or four large parts thus boldly diſtinguiſhed, will break a very long outline. When two woods are oppoſed on the ſides of a narrow glade, neither has ſo much occaſion for variety in itſelf as if it were ſingle ; if they are very different from each other, the contraſt ſupplies the deficiency to each, and the interval between them is full of variety. The form of that interval is indeed of as much conſequence as their own : though the outlines of both the woods be ſeparately beautiful, yet if together they do not caſt the open ſpace into an agreeable figure, the whole ſcene is not pleaſing ; and a figure is never agreeable, when the ſides too cloſely correſpond ; whether they are exactly the ſame, or exactly the reverſe of each other, they equally appear artificial.

Every variety of outline hitherto mentioned may be traced by the underwood alone ; but frequently the ſame effects may be produced with more eaſe, and with much more beauty, by a few trees ſtanding out from the thicket, and belonging, or ſeeming to belong to the wood, ſo as to make a part of its figure. Even where they are not wanted for the purpoſe, detached trees are ſuch agreeable objects, ſo diſtinct, ſo light, when compared to the covert about them, that ſkirting along it in ſome parts, and breaking it in others, they give an unaffected grace, which can no otherwiſe be given to the outline. They have a ſtill further effect, when they ſtretch acroſs the whole breadth of an inlet, or before part of a receſs into the wood : they are themſelves ſhown to advantage by the ſpace behind them ; and that ſpace, ſeen between their ſtems, they in return throw into an agreeable perſpective.

3
Of a Grove.

2. The prevailing character of a wood is generally grandeur : the principal attention therefore which it requires, is to prevent the exceſſes of that character, to diverſify the uniformity of its extent, to lighten the unwieldineſs of its bulk, and to blend graces with greatneſs. The character of a *grove* is beauty. Fine trees are lovely objects : a grove is an aſſemblage of them ; in which every individual retains much of its own peculiar elegance, and whatever it loſes is transferred to the ſuperior beauty of the whole. To a grove therefore, which admits of endleſs variety in the diſpoſition of the trees, differences in their ſhapes and their greens are ſeldom very important, and ſometimes they are detrimental. Strong contraſts ſcatter trees which are thinly planted, and which have not the connection of underwood ; they no longer form one plantation ; they are a number of ſingle trees. A thick grove is not indeed expoſed to this miſchief, and certain ſituations may recommend different ſhapes and different greens for their effects upon the ſurface ; but in the outline they are ſeldom much regarded. The eye attracted into the depth of the grove, paſſes by little circumſtances at the entrance ; even varieties in the form of the line do not always engage the attention : they are not ſo apparent as in a continued thicket, and are ſcarcely ſeen if they are not conſiderable.

But the ſurface and the outline are not the only circumſtances to be attended to. Though a grove be beautiful as an object, it is beſides delightful as a ſpot to walk or to ſit in ; and the choice and the diſpoſition of the trees for effects within, are therefore a principal conſideration. Mere irregularity alone will not pleaſe : ſtrict order is there more agreeable than abſolute confuſion ; and ſome meaning better than none. A regular plantation has a degree of beauty ; but it gives no ſatisfaction, becauſe we know that the ſame number of trees might be more beautifully arranged. A diſpoſition, however, in which the lines only are broken, without varying the diſtances, is equally improper. The trees ſhould gather into groupes, or ſtand in various irregular lines, and deſcribe ſeveral figures : the intervals between them ſhould be contraſted both in ſhape and in dimenſions ;

Ibid. ſions: a large ſpace ſhould in ſome places be quite open; in others the trees ſhould be ſo cloſe together, as hardly to leave a paſſage between them; and in others as far apart as the connection will allow. In the forms and the varieties of theſe groupes, theſe lines, and theſe openings, principally conſiſts the interior beauty of a grove.

The force of them is moſt ſtrongly illuſtrated at Claremont*: where the walk to the cottage, though deſtitute of many natural advantages, and eminent for none; though it commands no proſpect; though the water below it is a trifling pond; though it has nothing, in ſhort, but inequality of ground to recommend it; is yet the fineſt part of the garden: for a grove is there planted in a gently curved direction, all along the ſide of a hill, and on the edge of a wood, which riſes above it. Large receſſes break it into ſeveral clumps, which hang down the declivity; ſome of them approaching, but none reaching quite to the bottom. Theſe receſſes are ſo deep as to form great openings in the midſt of the grove; they penetrate almoſt to the covert: but the clumps being all equally ſuſpended from the wood; and a line of open plantation, though ſometimes narrow, running conſtantly along the top; a continuation of grove is preſerved, and the connection between the parts is never broken. Even a groupe, which near one of the extremities ſtands out quite detached, is ſtill in ſtyle ſo ſimilar to the reſt as not to loſe all relation. Each of theſe clumps is compoſed of ſeveral others ſtill more intimately united: each is full of groupes, ſometimes of no more than two trees, ſometimes of four or five, and now and then in larger cluſters: an irregular waving line iſſuing from ſome little crowd, loſes itſelf in the next; or a few ſcattered trees drop in a more diſtant ſucceſſion from the one to the other. The intervals, winding here like a glade, and widening there into broader openings, differ in extent, in figure, and direction; but all the groupes, the lines, and the intervals, are collected together into large general clumps, each of which is at the ſame time both compact and free, identical and various. The whole is a place wherein to tarry with ſecure delight, or ſaunter with perpetual amuſement.

The grove at Eſher-place was planted by the ſame maſterly hand; but the neceſſity of accommodating the young plantation to ſome large trees which grew there before, has confined its variety. The groupes are few and ſmall; there was not room for larger or for more: there were no opportunities to form continued narrow glades between oppoſite lines; the vacant ſpaces are therefore chiefly irregular openings ſpreading every way, and great differences of diſtance between the trees are the principal variety; but the grove winds along the bank of a large river, on the ſide and at the foot of a very ſudden aſcent, the upper part of which is covered with wood. In one place, it preſſes cloſe to the covert; retires from it in another; and ſtretches in a third acroſs a bold receſs, which runs up high into the thicket. The trees ſometimes overſpread the flat below; ſometimes leave an open ſpace to the river; at other times crown the brow of a large knole, climb up a ſteep, or hang on a gentle declivity. Theſe varieties in the ſituation more than compenſate for the want of variety in the diſpoſition of the trees; and the many happy circumſtances which concur

> ———— In Eſher's peaceful grove,
> Where Kent and nature vie for Pelham's love,

render this little ſpot more agreeable than any at Claremont. But though it was right to preſerve the trees already ſtanding, and not to ſacrifice great preſent beauties to ſtill greater in futurity; yet this attention has been a reſtraint; and the grove at Claremont, conſidered merely as a plantation, is in delicacy of taſte, and fertility of invention, ſuperior to that at Eſher.

It is, however, poſſible to ſecure both a preſent and a future effect, by fixing firſt on a diſpoſition which will be beautiful when the trees are large, and then intermingling another which is agreeable while they are ſmall. Theſe occaſional trees are hereafter to be taken away; and muſt be removed in time, before they become prejudicial to the others.

The conſequence of variety in the diſpoſition, is variety in the light and ſhade of the grove; which may be improved by the choice of the trees. Some are impenetrable to the fierceſt ſun-beam; others let in here and there a ray between the large maſſes of their foliage; and others, thin both of boughs and of leaves, only chequer the ground. Every degree of light and ſhade, from a glare to obſcurity, may be managed, partly by the number, and partly by the texture, of the trees. Differences only in the manner of their growths have alſo correſponding effects: there is a cloſeneſs under thoſe whoſe branches deſcend low, and ſpread wide; a ſpace and liberty where the arch above is high; and frequent tranſitions from the one to the other are very pleaſing. Theſe ſtill are not all the varieties of which the interior of a grove is capable: trees, indeed, whoſe branches nearly reach the ground, being each a ſort of thicket, are inconſiſtent with an open plantation: but though ſome of the characteriſtic diſtinctions are thereby excluded, other varieties more minute ſucceed in their place; for the freedom of paſſage throughout brings every tree in its turn near to the eye, and ſubjects even differences in foliage to obſervation. Theſe, ſlight as they may ſeem, are agreeable when they occur: it is true, they are not regretted when wanting; but a defect of ornament is not neceſſarily a blemiſh.

4 Of Clumps.

3. It has been already obſerved, that *Clumps* differ only in extent from woods, if they are cloſe; or from groves, if they are open: they are ſmall woods, and ſmall groves, governed by the ſame principles as the larger, after allowances made for their dimenſions. But beſides the properties they may have in common with woods or with groves, they have others peculiar to themſelves which require examination.

They are either *independent* or *relative*: when independent, their beauty, as ſingle objects, is ſolely to be attended to; when relative, the beauty of the individuals muſt be ſacrificed to the effect of the whole, which is the greater conſideration.

The *occaſions* on which independent clumps may be applied, are many. They are often deſirable as beautiful objects in themſelves; they are ſometimes neceſſary to break an extent of lawn, or a continued line whether of ground or of plantation; but on all occaſions a jealouſy of art conſtantly attends them, which irregularity in their figure will not always alone remove. Though elevations ſhow them to advantage, yet a hillock evidently thrown up on purpoſe to be crowned with a clump, is artificial to a degree of diſ-

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* New Eſher in Surry, England.

Ibid.

guſt: ſome of the trees ſhould therefore be planted on the ſides, to take off that appearance. The ſame expedient may be applied to clumps placed on the brow of a hill, to interrupt its ſameneſs: they will have leſs oſtentation of deſign, if they are in part carried down either declivity. The objection already made to planting many along ſuch a brow, is on the ſame principle: a ſingle clump is leſs ſuſpected of art; if it be an open one, there can be no finer ſituation for it, than juſt at the point of an abrupt hill, or on a promontory into a lake or a river. It is in either a beautiful termination, diſtinct by its poſition, and enlivened by an expanſe of ſky or of water about and beyond it. Such advantages may balance little defects in its form: but they are loſt if other clumps are planted near it: art then intrudes, and the whole is diſpleaſing.

But though a multiplicity of clumps, when each is an independent object, ſeldom ſeems natural; yet a number of them may, without any appearance of art, be admitted into the ſame ſcene, if they bear a *relation* to each other: if by their ſucceſſion they diverſify a continued outline of wood, if between them they form beautiful glades, if all together they caſt an extenſive lawn into an agreeable ſhape, the *effect* prevents any ſcrutiny into the means of producing it. But when the reliance on that effect is ſo great, every other conſideration muſt give way to the beauty of the whole. The figure of the glade, of the lawn, or of the wood, are principally to be attended to: the fineſt clumps, if they do not fall eaſily into the great lines, are blemiſhes; their connections, their contraſts, are more important than their forms.

5 Of a Lake.

III. WATER. All inland water is either *running* or *ſtagnated*. When ſtagnated, it forms a *lake* or a *pool*, which differ only in extent; and a *pool* and a *pond* are the ſame. Running waters are either a *rivulet*, a *river*, or a *rill*; and theſe differ only in breadth: a *rivulet* and a *brook* are ſynonymous terms; a *ſtream* and a *current* are general names for all.

1. Space or expanſion is eſſential to a *Lake*. It cannot be too large as a ſubject of deſcription or of contemplation; but the eye receives little ſatisfaction when it has not a form on which to reſt: the ocean itſelf hardly atones by all its grandeur for its infinity; and a proſpect of it is, therefore, always moſt agreeable, when in ſome part, at no great diſtance, a reach of ſhore, a promontory, or an iſland, reduces the immenſity into ſhape. An artificial lake, again, may be comparatively extravagant in its dimenſions. It may be ſo out of proportion to its appendages, as to ſeem a waſte of water; for all ſize is in ſome reſpects relative: if this exceeds its due dimenſions, and if a flatneſs of ſhore beyond it adds ſtill to the drearineſs of the ſcene; wood to raiſe the banks, and objects to diſtinguiſh them, are the remedies to be employed. If the length of a piece of water be too great for its breadth ſo as to deſtroy all idea of circuity, extremities ſhould be conſidered as too far off, and made important to give them proximity; while at the ſame time the breadth may be favoured, by keeping down the banks on the ſides. On the ſame principle, if the lake be too ſmall, a low ſhore will, in appearance, increaſe the extent.

But it is not neceſſary that the whole ſcene be bounded: if form be impreſſed on a conſiderable part, the eye can, without diſguſt, permit a large reach to ſtretch beyond its ken; it can even be pleaſed to obſerve a tremulous motion in the horizon, which ſhows that the water has not there yet attained its termination. Still ſhort of this, the extent may be kept in uncertainty; a hill or a wood may conceal one of the extremities, and the country beyond it, in ſuch a manner as to leave room for the ſuppoſed continuation of ſo large a body of water. Opportunities to chooſe this ſhape are frequent, and it is the moſt perfect of any; the ſcene is cloſed, but the extent of the lake is undetermined; a complete form is exhibited to the eye, while a boundleſs range is left open to the imagination.

But mere form will only give content, not delight: that depends upon the outline, which is capable of exquiſite beauty; and the *bays*, the *creeks*, and the *promontories*, which are ordinary parts of that outline, together with the accidents of *iſlands*, of *inlets* and of *outlets* to rivers, are in their ſhapes and their combinations an inexhauſtible fund of variety.

Bays, creeks, and promontories, however, though extremely beautiful, ſhould not be very numerous: for a ſhore broken into little points and hollows has no certainty of outline; it is only ragged, not diverſified; and the diſtinctneſs and ſimplicity of the great parts are hurt by the multiplicity of ſubdiviſions. But iſlands, though the channels between them be narrow, do not ſo often derogate from greatneſs: they intimate a ſpace beyond them whoſe boundaries do not appear; and remove to a diſtance the ſhore which is ſeen in perſpective between them. Such partial interruptions of the ſight ſuggeſt ideas of extent to the imagination.

6 Of a river.

2. Though the windings of a *River* are proverbially deſcriptive of its courſe; yet without being perpetually wreathed, it may be natural. Nor is the character expreſſed only by the turnings. On the contrary, if they are too frequent and ſudden, the current is reduced into a number of ſeparate pools, and the idea of progreſs is obſcured by the difficulty of tracing it. Length is the ſtrongeſt ſymptom of continuation: long reaches are therefore characteriſtic of a river, and they conduce much to its beauty; each is a conſiderable piece of water, and variety of beautiful forms may be given to their outlines.

A river requires a number of *accompaniments*. The changes in its courſe furniſh a variety of ſituations; while the fertility, convenience, and amenity, which attend it, account for all appearances of inhabitants and improvement. Profuſion of ornament on a fictitious river, is a juſt imitation of cultivated nature. Every ſpecies of building, every ſtyle of plantation, may abound on the banks; and whatever be their characters, their proximity to the water is commonly the happieſt circumſtance in their ſituation. A luſtre is from thence diffuſed on all around; each derives an importance from its relation to this capital feature: thoſe which are near enough to be reflected, immediately belong to it; thoſe at a greater diſtance ſtill ſhare in the animation of the ſcene; and objects totally detached from each other, being all attracted towards the ſame intereſting connection, are united into one compoſition.

In the front of Blenheim was a deep broad valley, which abruptly ſeparated the caſtle from the lawn and the plantations before it; even a direct approach could not be made without building a monſtrous bridge over the vaſt hollow: but this forced communication was only a ſubject of raillery: and the ſcene continued broken into two parts, abſolutely diſtinct from each other. This valley has been lately flooded: it is not filled; the bottom only is covered with water: the ſides are ſtill very high; but they are no longer the ſteeps of a chaſm, they are the bold ſhores of a noble river. The ſame bridge is ſtanding without alteration: but no extravagance remains; the water gives it propriety. Above it the river firſt appears, winding from behind a ſmall thick wood, in the valley; and ſoon taking a determined courſe, it is then broad enough to admit an iſland filled with the fineſt trees: others, correſponding to them in growth and diſpoſition, ſtand in groupes on the banks, intermixed with younger plantations. Immediately below the bridge, the river ſpreads into a large expanſe: the ſides are open lawn. On that furtheſt from the houſe formerly ſtood the palace of Henry II. celebrated in many an ancient ditty by the name of Fair Roſamond's Bower. A little clear ſpring, which riſes there, is by the country people ſtill called Fair Roſamond's Well. The ſpot is now marked by a ſingle willow. Near it is a fine collateral ſtream, of a beautiful form, retaining its breadth as far as it is ſeen, and retiring at laſt behind a hill from the view. The main river, having received this acceſſion, makes a gentle bend; then continues for a conſiderable length in one wide direct reach; and, juſt as it diſappears, throws itſelf down a high caſcade, which is the preſent termination. On one of the banks of this reach is the garden: the ſteeps are there diverſified with thickets and with glades; but the covert prevails, and the top is crowned with lofty trees. On the other ſide is a noble hanging wood in the park: it was depreciated when it ſunk into a hollow, and was poorly loſt in the bottom; but it is now a rich appendage to the river, falling down an eaſy ſlope quite to the water's edge, where, without overſhadowing, it is reflected on the ſurface. Another face of the ſame wood borders the collateral ſtream, with an outline more indented and various; while a very large irregular clump adorns the oppoſite declivity. This clump is at a conſiderable diſtance from the principal river: but the ſtream it belongs to brings it down to connect with the reſt; and the other objects, which were before diſperſed, are now, by the intereſt of each in a relation which is common to all, collected into one illuſtrious ſcene. The caſtle is itſelf a prodigious pile of building: which, with all the faults in its architecture, will never ſeem leſs than a truly princely habitation; and the confined ſpot where it was placed, on the edge of an abyſs, is converted into a proud ſituation, commanding a beautiful proſpect of water, and open to an extenſive lawn, adequate to the manſion, and an emblem of its domain. In the midſt of this lawn ſtands a column, a ſtately trophy, recording the exploits of the Duke of Marlborough, and the gratitude of Britain. Between this pillar and the caſtle is the bridge, which now, applied to a ſubject worthy of it, is eſtabliſhed in all the importance due to its greatneſs. The middle arch is wider than the Rialto, but not too wide for the occaſion; and yet this is the narroweſt part of the river: but the length of the reaches is every where proportioned to their breadth. Each of them is alone a noble piece of water; and the laſt, the fineſt of all, loſes itſelf gradually in a wood, which on that ſide is alſo the boundary of the lawn, and riſes into the horizon. All is great in the front of Blenheim: but in that vaſt ſpace no void appears; ſo important are the parts, ſo magnificent the objects. The plain is extenſive, the valley is broad, the wood is deep. Though the intervals between the buildings are large, they are filled with the grandeur which buildings of ſuch dimenſions and ſo much pomp diffuſe all around them; and the river, in its long varied courſe, approaching to every object, and touching upon every part, ſpreads its influence over the whole.

In the compoſition of this ſcene, the river, both as a part itſelf, and as uniting the other parts, has a principal ſhare. But water is not loſt though it be in ſo confined or ſo concealed a ſpot as to enter into no view; it may render that ſpot delightful. It is capable of the moſt exquiſite beauty in its form; and though not in ſpace, may yet in diſpoſition have pretenſions to greatneſs; for it may be divided into ſeveral branches, which will form a cluſter of iſlands all connected together, make the whole place irriguous, and, in the ſtead of extent, ſupply a quantity of water. Such a ſequeſtrated ſcene uſually owes its retirement to the trees and the thickets with which it abounds: but, in the diſpoſition of them, one diſtinction ſhould be conſtantly attended to. A river flowing through a wood which overſpreads one continued ſurface of ground, and a river between two woods, are in very different circumſtances. In the latter caſe, the woods are ſeparate; they may be contraſted in their forms and their characters, and the outline of each ſhould be forcibly marked. In the former, no outline ought to be diſcernible; for the river paſſes between trees, not between boundaries; and though, in the progreſs of its courſe, the ſtyle of the plantations may be often changed, yet on the oppoſite banks a ſimilarity ſhould conſtantly prevail, that the identity of the wood may never be doubtful.

A river between two woods may enter into a view; and then it muſt be governed by the principles which regulate the conduct and the accompaniments of a river in an open expoſure. But when it runs through a wood, it is never to be ſeen in proſpect: the place is naturally full of obſtructions; and a continued opening, large enough to receive a long reach, would ſeem an artificial cut. The river muſt therefore neceſſarily wind more than in croſſing a lawn, where the paſſage is entirely free. But its influence will never extend ſo far on the ſides: the buildings muſt be near the banks; and, if numerous, will ſeem crowded, being all in one track, and in ſituations nearly alike. The ſcene, however, does not want variety: on the contrary, none is capable of more. The objects are not indeed ſo different from each other as in an open view; but they are very different, and in much greater abundance: for this is the interior of a wood, where every tree is an object, every combination of trees a variety, and no large intervals are requiſite to diſtinguiſh the ſeveral diſpoſitions; the grove, the thicket, or the groupes,

Ibid.

may prevail, and their forms and their relations may be conſtantly changed, without reſtraint of fancy, or limitation of number.

Water is ſo univerſally and ſo deſervedly admired in a proſpect, that the moſt obvious thought in the management of it, is to lay it as open as poſſible, and purpoſely to conceal it would generally ſeem a ſevere ſelf-denial: yet ſo many beauties may attend its paſſage through a wood, that larger portions of it might be allowed to ſuch retired ſcenes than are commonly ſpared from the view, and the different parts in different ſtyles would be fine contraſts to each other. If the water at Wotton* were all expoſed, a walk of near two miles along the banks would be of a tedious length, from the want of thoſe changes of the ſcene which now ſupply through the whole extent a ſucceſſion of perpetual variety. That extent is ſo large as to admit of a diviſion into four principal parts, all of them great in ſtyle and in dimenſions, and differing from each other both in character and ſituation. The two firſt are the leaſt. The one is a reach of a river, about the third of a mile in length, and of a competent breadth, flowing through a lovely mead, open in ſome places to views of beautiful hills in the country, and adorned in others with clumps of trees, ſo large, that their branches ſtretch quite acroſs, and form a high arch over the water. The next ſeems to have been once a formal baſin encompaſſed with plantations, and the appendages on either ſide ſtill retain ſome traces of regularity; but the ſhape of the water is free from them: the ſize is about 14 acres; and out of it iſſue two broad collateral ſtreams, winding towards a large river, which they are ſeen to approach, and ſuppoſed to join. A real junction is however impoſſible, from the difference of the levels; but the terminations are ſo artfully concealed, that the deception is never ſuſpected, and when known is not eaſily explained. The river is the third great diviſion of the water; a lake into which it falls, is the fourth. Theſe two do actually join; but their characters are directly oppoſite; the ſcenes they belong to are totally diſtinct; and the tranſition from the one to the other is very gradual: for an iſland near the conflux dividing the breadth, and concealing the end of the lake, moderates for ſome way the ſpace; and permitting it to expand but by degrees, raiſes an idea of greatneſs, from uncertainty accompanied with increaſe. The reality does not diſappoint the expectation; and the iſland, which is the point of view, is itſelf equal to the ſcene: it is large, and high above the lake; the ground is irregularly broken; thickets hang on the ſides; and towards the top is placed an Ionic portico, which commands a noble extent of water, not leſs than a mile in circumference, bounded on one ſide with wood, and open on the other to two ſloping lawns, the leaſt of an hundred acres, diverſified with clumps, and bordered by plantations. Yet this lake, when full in view, and with all the importance which ſpace, form, and ſituation can give, is not more intereſting than the ſequeſtered river, which has been mentioned as the third great diviſion of the water. It is juſt within the verge of a wood, three quarters of a mile long, every where broad, and its courſe is ſuch as to admit of infinite variety without any confuſion. The banks are cleared of underwood; but a few thickets ſtill remain, and on one ſide an impenetrable covert ſoon begins: the interval is a beautiful grove of oaks, ſcattered over a green ſward of extraordinary verdure. Between theſe trees and theſe thickets the river ſeems to glide gently along, conſtantly winding, without one ſhort turn or one extended reach in the whole length of the way. This even temper in the ſtream ſuits the ſcenes through which it paſſes; they are in general of a very ſober caſt, not melancholy, but grave; never expoſed to a glare; never darkened with gloom; nor by ſtrong contraſts of light and ſhade, exhibiting the exceſs of either. Undiſturbed by an extent of proſpect without, or a multiplicity of objects within, they retain at all times a mildneſs of character; which is ſtill more forcibly felt when the ſhadows grow faint as they lenghten, when a little ruſtling of birds in the ſpray, the leaping of the fiſh, and the fragrancy of the woodbine, denote the approach of evening; while the ſetting ſun ſhoots its laſt gleams on a Tuſcan portico, which is cloſe to the great baſin, but which from a ſeat near this river is ſeen at a diſtance, through all the obſcurity of the wood glowing on the banks, and reflected on the ſurface of the water. In another ſtill more, diſtinguiſhed ſpot is built an elegant bridge, with a colonnade upon it, which not only adorns the place where it ſtands, but is alſo a pictureſque object to an octagon building near the lake, where it is ſhown in a ſingular ſituation, over-arched, encompaſſed, and backed with wood, without any appearance of the water beneath. This building in return is alſo an object from the bridge; and a Chineſe room, in a little iſland juſt by, is another: neither of them are conſiderable, and the others which are viſible are at a diſtance, but more or greater adventitious ornaments are not required in a ſpot ſo rich as this in beauties peculiar to its character. A profuſion of water pours in from all ſides round upon the view; the opening of the lake appears; a glympſe is caught of the large baſin; one of the collateral ſtreams is full in ſight, and the bridge itſelf is in the midſt of the fineſt part of the river: all ſeem to communicate the one with the other. Though thickets often intercept, and groupes perplex, the view, yet they never break the connection between the ſeveral pieces of water; each may ſtill be traced along large branches, or little catches; which in ſome places are overſhadowed and dim; in others gliſten through a glade, or glimmer between the boles of trees in a diſtant perſpective; and in one, where they are quite loſt to the view; ſome arches of a ſtone-bridge, but partially ſeen among the wood, preſerve their connection.

7
Of a Rill and a Rivulet.

3. If a large river may ſometimes, a ſmaller current undoubtedly may often, be conducted through a wood: it ſeldom adorns, it frequently disfigures, a proſpect, where its courſe is marked, not by any appearance of water, but by a confuſed line of clotted graſs, which diſagrees with the general verdure. A rivulet may, indeed, have conſideration enough for a home ſcene, though it be open; but a *Rill* is always moſt agreeable when moſt retired from public view. Its characteriſtic excellencies are vivacity and variety, which require attention, leiſure, and ſilence, that the eye may pore upon the little beauties, and the ear liſten to the low murmurs of the ſtream without interruption. To ſuch indulgence a confined ſpot only is favourable; a cloſe

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* Vale of Ayleſbury, Buckinghamſhire.

Ibid. copſe is therefore often more acceptable than a high wood, and a ſequeſtered valley at all times preferable to any open expoſure: a ſingle rill at a very little diſtance is a mere water-courſe; it loſes all its charms; it has no importance in itſelf, and bears no proportion to the ſcene. A number of little ſtreams have indeed an effect in any ſituation, but not as objects; they are intereſting only on account of the character they expreſs, the irriguous appearance which they give to the whole.

The full tide of a large river has more force than activity, and ſeems too unwieldy to allow of very quick tranſitions. But in a rill, the agility of its motion accounts for every caprice: frequent windings diſguiſe its inſignificance; ſhort turnings ſhow its vivacity; ſudden changes in the breadth are a ſpecies of its variety; and however fantaſtically the channel may be wreathed, contracted, and widened, it ſtill appears to be natural. We find an amuſement in tracing the little ſtream through all the intricacies of its courſe, and in ſeeing it force a paſſage through a narrow ſtrait, expatiate on every opportunity, ſtruggle with obſtructions, and puzzle out its way. A rivulet, which is the mean betwixt a river and a rill, partakes of the character of both: it is not licenſed to the extravagance of the one, nor under the ſame reſtraints as the other: it may have more frequent bends than the river, longer reaches than a rill: the breadth of a ſtream determines whether the principal beauty reſults from extent or from variety.

The murmurs of a rill are amongſt the moſt pleaſing circumſtances which attend it. If the bed of the ſtream be rough, mere declivity will occaſion a conſtant ripling noiſe: when the current drops down a deſcent, though but of a few inches, or forcibly bubbles up from a little hollow, it has a deep gurgling tone, not uniformly continued, but inceſſantly repeated, and therefore more engaging than any. The flatteſt of all, is that ſound rather of the ſplaſhing than the fall of water, which an even gentle ſlope, or a tame obſtruction, will produce: this is leſs pleaſing than the others; but none ſhould be entirely excluded: all in their turns are agreeable; and the choice of them is much in our power. By obſerving their cauſes, we may often find the means to ſtrengthen, to weaken, or to change them; and the addition or removal of a ſingle ſtone, or a few pebbles, will ſometimes be ſufficient for the purpoſe.

8 Of Caſcades. A rill cannot pretend to any ſound beyond that of a little water-fall: the roar of a caſcade belongs only to larger ſtreams; but it may be produced by a rivulet to a conſiderable degree, and attempts to do more have generally been unſucceſsful. A vain ambition to imitate nature in her great extravagancies betrays the weakneſs of art. Though a noble river, throwing itſelf headlong down a precipice, be an object truly magnificent, it muſt however be confeſſed, that in a ſingle ſheet of water there is a formality which its vaſtneſs alone can cure. But the height, not the breadth, is the wonder: when it falls no more than a few feet, the regularity prevails; and its extent only ſerves to expoſe the vanity of affecting the ſtyle of a cataract in an artificial caſcade. It is leſs exceptionable if divided into ſeveral parts: for then each ſeparate part may be wide enough for its depth; and in the whole, variety, not greatneſs, will be the predominant character. But a ſtructure of rough, large, detached ſtones, cannot eaſily be contrived of ſtrength ſufficient to ſupport a great weight of water: it is ſometimes from neceſſity almoſt ſmooth and uniform, and then it loſes much of its effect. Several little falls in ſucceſſion are preferable to one great caſcade which in figure or in motion approaches to regularity.

When greatneſs is thus reduced to number, and length becomes of more importance than breadth, a rivulet vies with a river; and it more frequently runs in a continued declivity, which is very favourable to ſuch a ſucceſſion of falls. Half the expence and labour which are ſometimes beſtowed on a river, to give it at the beſt a forced precipitancy in one ſpot only, would animate a rivulet through the whole of its courſe. And, after all, the moſt intereſting circumſtance in falling waters is their animation. A great caſcade fills us with ſurpriſe: but all ſurpriſe muſt ceaſe; and the motion, the agitation, the rage, the froth, and the variety of the water, are finally the objects which engage the attention: for theſe a rivulet is ſufficient; and they may there be produced without that appearance of effort which riſes a ſuſpicion of art.

To obviate ſuch a ſuſpicion, it may be ſometimes expedient to begin the deſcent out of ſight; for the beginning is the difficulty: if that be concealed, the ſubſequent falls ſeem but a conſequence of the agitation which characteriſes the water at its firſt appearance; and the imagination is, at the ſame time, let looſe to give ideal extent to the caſcades. When a ſtream iſſues from a wood, ſuch management will have a great effect: the bends of its courſe in an open expoſure may afford frequent opportunities for it; and ſometimes a low broad bridge may furniſh the occaſion: a little fall hid under the arch will create a diſorder; in conſequence of which, a greater caſcade below will appear very natural.

9 Of Rocks. IV. ROCKS. Rocks are themſelves too vaſt and too ſtubborn to ſubmit to our controul; but by the addition or removal of appendages which we can command, parts may be ſhown or concealed, and the characters with their impreſſions may be weakened or enforced: to adapt the accompaniments accordingly, is the utmoſt ambition of art when rocks are the ſubject.

Their moſt diſtinguiſhed characters are, *dignity*, *terror*, and *fancy*: the expreſſions of all are conſtantly wild: and ſometimes a rocky ſcene is only wild, without pretenſions to any particular character.

Rills, rivulets, and caſcades, abound among rocks: they are natural to the ſcene; and ſuch ſcenes commonly require every accompaniment which can be procured for them. Mere rocks, unleſs they are peculiarly adapted to certain impreſſions, though they may ſurpriſe, cannot be long engaging, if the rigour of their character be not ſoftened by circumſtances which may belong either to theſe or to more cultivated ſpots: and when the dreárineſs is extreme, little ſtreams and water-falls are of themſelves inſufficient for the purpoſe; an intermixture of vegetation is alſo neceſſary, and on ſome occaſions even marks of inhabitants are proper.

Large clefts, ſloping or precipitous, with a dale at bottom, furniſh ſcenes of the wildeſt nature. In ſuch ſpots, verdure alone will give ſome relief to the dreárineſs of the ſcene; and ſhrubs or buſhes, without trees, are a ſufficiency of wood: the thickets may alſo be extended by the creeping plants, ſuch as pyracantha, vines, and ivy, to wind up the ſides or cluſter on the tops of the rocks. And to this vegetation may be added ſome ſymptoms of inhabitants, but they muſt be ſlight and few; the uſe of them is only to cheer, not to deſtroy, the ſolitude of the place; and ſuch therefore ſhould be choſen as are ſometimes found in ſituations retired from public reſort; a cottage may be lonely, but it muſt not here ſeem ruinous and neglected; it ſhould be tight and warm, with every mark of comfort about it, to which its poſition in ſome ſheltered receſs may greatly contribute. A cavity alſo in the rocks, rendered eaſy of acceſs, improved to a degree of convenience, and maintained in a certain ſtate of preſervation, will ſuggeſt ſimilar ideas of protection from the bittereſt inclemencies of the ſky, and even of occaſional refreſhment and repoſe. But we may venture ſtill further; a mill is of neceſſity often built at ſome diſtance from the town which it ſupplies; and here it would at the ſame time apply the water to a uſe, and increaſe its agitation. The dale may beſides be made the haunt of thoſe animals, ſuch as goats, which are ſometimes wild, and ſometimes domeſtic; and which accidentally appearing, will divert the mind from the ſenſations natural to the ſcene, but not agreeable if continued long without interruption. Theſe and ſuch other expedients will approximate the ſevereſt retreat to the habitations of men, and convert the appearance of a perpetual baniſhment into that of a temporary retirement from ſociety.

But too ſtrong a force on the nature of the place always fails. A winding path, which appears to be worn not cut, has more effect than a high road, all artificial and level, which is too weak to overbear, and yet contradicts, the general idea. The objects therefore to be introduced muſt be thoſe which hold a mean between ſolitude and population; and the inclination of that choice towards either extreme, ſhould be directed by the degree of wildneſs which prevails; for tho' that runs ſometimes to an exceſs which requires correction, at other times it wants encouragement, and at all times it ought to be preſerved: it is the predominant character of rocks, which mixes with every other, and to which all the appendages muſt be accommodated; and they may be applied ſo as greatly to increaſe it: a licentious irregularity of wood and of ground, and a fantaſtic conduct of the ſtreams, neither of which would be tolerated in the midſt of cultivation, become and improve romantic rocky ſpots; even buildings, partly by their ſtyle, but ſtill more by their poſition, in ſtrange, difficult, or dangerous ſituations, diſtinguiſh and aggravate the native extravagancies of the ſcene.

Greatneſs is a chief ingredient in the character of *dignity*, with leſs of wildneſs than in any other. The effect here depends more upon amplitude of ſurface, than variety of forms. The parts therefore, muſt be large: if the rocks are only high, they are but ſtupendous, not majeſtic: breadth is equally eſſential to their greatneſs; and every ſlender, every groteſque ſhape, is excluded. Art may interpoſe to ſhow theſe large parts to the eye, and magnify them to the imagination, by taking away thickets which ſtretch quite acroſs the rocks, ſo as to diſguiſe their dimenſions; or by filling with wood the ſmall intervals between them, and thus, by concealing the want, preſerving the appearance of continuation. When rocks retire from the eye down a gradual declivity, we can, by raiſing the upper ground, deepen the fall, lengthen the perſpective, and give both height and extent to thoſe at a diſtance: this effect may be ſtill increaſed by covering that upper ground with a thicket, which ſhall ceaſe, or be lowered, as it deſcends. A thicket, on other occaſions, makes the rocks which riſe out of it ſeem larger than they are. If they ſtand upon a bank overſpread with ſhrubs, their beginning is at the leaſt uncertain; and the preſumption is, that they ſtart from the bottom. Another uſe of this bruſhy underwood is to conceal the fragments and rubbiſh which have fallen from the ſides and the brow, and which are often unſightly. Rocks are ſeldom remarkable for the elegance of their forms; they are too vaſt, and too rude, to pretend to delicacy: but their ſhapes are often agreeable; and we can affect thoſe ſhapes to a certain degree, at leaſt we can cover many blemiſhes in them, by conducting the growth of ſhrubby and creeping plants about them.

For all theſe purpoſes mere underwood ſuffices: but for greater effects larger trees are requiſite: they are worthy of the ſcene; and not only improvements, but acceſſions to its grandeur: we are uſed to rank them among the nobleſt objects of nature; and when we ſee that they cannot aſpire to the midway of the heights around them, the rocks are raiſed by the compariſon. A ſingle tree is therefore, often preferable to a clump: the ſize, though really leſs, is more remarkable: and clumps are beſides generally exceptionable in a very wild ſpot, from the ſuſpicion of art which attends them; but a wood is free from that ſuſpicion, and its own character of greatneſs recommends it to every ſcene of magnificence.

On the ſame principle, all poſſible conſideration ſhould be given to the ſtreams. No number of little rills are equal to one broad river; and in the principal current, ſome varieties may be ſacrificed to importance: but a degree of ſtrength ſhould always be preſerved: the water, though it needs not be furious, ſhould not be dull; for dignity, when moſt ſerene, is not languid; and ſpace will hardly atone for want of animation.

This character does not exclude marks of inhabitants, though it never requires them to tame its wildneſs: and without inviting, it occaſionally admits an intermixture of vegetation. It even allows of buildings intended only to decorate the ſcene: but they muſt be adequate to it, both in ſize and in character. And if cultivation is introduced, that too ſhould be conformable to the reſt; not a ſingle narrow patch cribbed out of the waſte; but the confines of a country ſhelving into the vale, and ſuggeſting the idea of extent: nothing trivial ought to find admittance. But, on the other hand, no extravagance required to ſupport it: ſtrange ſhapes in extraordinary poſitions, enormous weights unaccountably ſuſtained, trees rooted in the ſides, and torrents raging at the foot of the rocks, are at the beſt needleſs exceſſes. There is a temperance in dignity, which is rather hurt by a wanton violence on the common order of nature.

The terrors of a ſcene in nature are like thoſe of a dramatic repreſentation: they give an alarm; but the ſenſations are agreeable, ſo long as they are kept to

Rocks.
Ibid.

ſuch as are allied only to terror, unmixed with any that are horrible and diſguſting. Art may therefore be uſed to heighten them, to diſplay the objects which are diſtinguiſhed by greatneſs, to improve the circumſtances which denote force, to mark thoſe which intimate danger, and to blend with all here and there a caſt of melancholy.

Greatneſs is as eſſential to the character of *terror* as to that of dignity: vaſt efforts in little objects are but ridiculous; nor can force be ſuppoſed upon trifles incapable of reſiſtance. On the other hand, it muſt be allowed, that exertion and violence ſupply ſome want of ſpace. A rock wonderfully ſupported, or threatening to fall, acquires a greatneſs from its ſituation, which it has not in dimenſions; ſo circumſtanced, the ſize appears to be monſtrous: a torrent has a conſequence which a placid river of equal breadth cannot pretend to: and a tree, which would be inconſiderable in the natural ſoil, becomes important when it burſts from a rock.

Such circumſtances ſhould be always induſtriouſly ſought for. It may be worth while to cut down ſeveral trees, in order to exhibit one apparently rooted in the ſtone. By the removal perhaps of only a little bruſhwood, the alarming diſpoſition of a rock, ſtrangely undermined, rivetted, or ſuſpended, may be ſhown; and if there be any ſoil above its brow, ſome trees planted there, and impending over it, will make the object ſtill more extraordinary. As to the ſtreams, great alteration may generally be made in them: and therefore it is of uſe to aſcertain the ſpecies proper to each ſcene, becauſe it is in our power to enlarge or contract their dimenſions; to accelerate or retard their rapidity; to form, increaſe, or take away obſtructions; and always to improve, often to change, their characters.

Inhabitants furniſh frequent opportunities to ſtrengthen the appearances of force, by giving intimations of danger. A houſe placed at the edge of a precipice, any building on the pinnacle of a craig, makes that ſituation ſeem formidable, which might otherwiſe have been unnoticed: a ſteep, in itſelf not very remarkable, becomes alarming, when a path is carried aſlant up the ſide: a rail on the brow of a perpendicular fall, ſhows that the height is frequented and dangerous: and a common foot-bridge thrown over a cleft between rocks has a ſtill ſtronger effect. In all theſe inſtances, the imagination immediately tranſports the ſpectator to the ſpot, and ſuggeſts the idea of looking down ſuch a depth: in the laſt, that depth is a chaſm, and the ſituation is directly over it.

In other inſtances, exertion and danger ſeem to attend the occupations of the inhabitants:

————Half way down
Hangs one that gathers ſamphire; dreadful trade!

is a circumſtance choſen by the great poet of nature, to aggravate the terrors of the ſcene he deſcribes.

The different ſpecies of rocks often meet in the ſame place, and compoſe a noble ſcene, which is not diſtinguiſhed by any particular character: it is only when one eminently prevails, that it deſerves ſuch a preference as to exclude every other. Sometimes a ſpot remarkable for nothing but its wildneſs, is highly romantic: and when this wildneſs riſes to *fancy*; when the moſt ſingular, the moſt oppoſite forms and combinations are thrown together; then a mixture alſo of ſeveral characters adds to the number of inſtances which there concur to diſplay the inexhauſtible variety of nature.

Rocks.
Ibid.

So much variety, ſo much fancy, are ſeldom found within the ſame extent as in Dovedale †. It is about two miles in length, a deep, narrow, hollow valley: both the ſides are of a rock; and the Dove in its paſſage between them is perpetually changing its courſe, its motion, and appearance. It is never leſs than ten, nor ſo much as twenty yards wide, and generally about four feet deep; but tranſparent to the bottom, except when it is covered with a foam of the pureſt white, under water-falls, which are perfectly lucid. Theſe are very numerous, but very different. In ſome places they ſtretch ſtraight acroſs, or aſlant the ſtream: in others, they are only partial: and the water either daſhes againſt the ſtones, and leaps over them, or, pouring along a ſteep, rebounds upon thoſe below; ſometimes it ruſhes through the ſeveral openings between them; ſometimes it drops gently down; and at other times it is driven back by the obſtruction, and turns into an eddy. In one particular ſpot, the valley almoſt cloſing, leaves hardly a paſſage for the river, which pent up, and ſtruggling for a vent, rages, and roars, and foams, till it has extricated itſelf from the confinement. In other parts, the ſtream, though never languid, is often gentle; flows round a little deſart iſland, glides between bits of bulruſhes, diſperſes itſelf among tufts of graſs or of moſs, bubbles about a water-dock, or plays with the ſlender threads of aquatic plants which float upon the ſurface. The rocks all along the dale vary as often in their ſtructure as the ſtream in its motion. In one place, an extended ſurface gradually diminiſhes from a broad baſe almoſt to an edge; in another, a heavy top hanging forwards, overſhadows all beneath: ſometimes many different ſhapes are confuſedly tumbled together; and ſometimes they are broken into ſlender ſharp pinnacles, which riſe upright, often two or three together, and often in more numerous cluſters. On this ſide of the dale, they are univerſally bare; on the other they are intermixed with wood; and the vaſt height of both the ſides, with the narrowneſs of the interval between them, produces a further variety: for whenever the ſun ſhines from behind the one, the form of it is diſtinctly and completely caſt upon the other; the rugged ſurface on which it falls diverſifies the tints; and a ſtrong reflected light often glares on the edge of the deepeſt ſhadow. The rocks never continue long in the ſame figure or ſituation, and are very much ſeparated from each other: ſometimes they form the ſides of the valley, in precipices, in ſteeps, or in ſtages; ſometimes they ſeem to riſe in the bottom, and lean back againſt the hill; and ſometimes they ſtand out quite detached, heaving up in cumbrous piles, or ſtarting into conical ſhapes, like vaſt ſpars, 100 feet high; ſome are firm and ſolid throughout; ſome are cracked; and ſome, ſplit and undermined, are wonderfully upheld by fragments apparently unequal to the weight they ſuſtain. One is placed before, one over another, and one fills at ſome diſtance behind an interval between two. The changes in their diſpoſition are infinite; every ſtep produces ſome new combination; they are continually croſſing, advancing, and retiring:

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† Near Aſhbourne in Derbyſhire.

Ibid.

tiring: the breadth of the valley is never the ſame 40 yards together: at the narrow paſs which has been mentioned, the rocks almoſt meet at the top, and the ſky is ſeen as through a chink between them: juſt by this gloomy abyſs, is a wider opening, more light, more verdure, more chearfulneſs, than any where elſe in the dale. Nor are the forms and the ſituations of the rocks their only variety: many of them perforated by large natural cavities, ſome of which open to the ſky, ſome terminate in dark receſſes, and through ſome are to be ſeen ſeveral more uncouth arches, and rude pillars, all detached, and retiring beyond each other, with the light ſhining in between them, till a rock far behind them cloſes the perſpective: the noiſe of the caſcades in the river echoes amongſt them; the water may often be heard at the ſame time gurgling near, and roaring at a diſtance; but no other ſounds diſturb the ſilence of the ſpot: the only trace of men is a blind path, but lightly and but ſeldom trodden, by thoſe whom curioſity leads to ſee the wonders they have been told of Dovedale. It ſeems indeed a fitter haunt for more ideal beings: the whole has the air of enchantment. The perpetual ſhifting of the ſcenes; the quick tranſitions, the total changes; then the forms all around, groteſque as chance can caſt, wild as nature can produce, and various as imagination can invent; the force which ſeems to have been exerted to place ſome of the rocks where they are now fixed immoveable, the magic by which others appear ſtill to be ſuſpended; the dark caverns, the illuminated receſſes, the fleeting ſhadows, and the gleams of light glancing on the ſides, or trembling on the ſtream; and the lonelineſs and the ſtillneſs of the place, all crowding together on the mind, almoſt realize the ideas which naturally preſent themſelves in this region of romance and of fancy.

The ſolitude of ſuch a ſcene is agreeable, on account of the endleſs entertainment which its variety affords, and in the contemplation of which both the eye and the mind are delighted to indulge: marks of inhabitants and cultivation would diſturb that ſolitude; and ornamental buildings are too artificial in a place ſo abſolutely free from reſtraint. The only accompaniments proper for it are wood and water; and by theſe ſometimes improvements may be made. When two rocks ſimilar in ſhape and poſition are near together, by ſkirting one of them with wood, while the other is left bare, a material diſtinction is eſtabliſhed between them: if the ſtreams be throughout of one character, it is in our power, and ſhould be our aim, to introduce another. Variety is the peculiar property of the ſpot, and every acceſſion to it is a valuable acquiſition. On the ſame principle, endeavours ſhould be uſed not only to multiply, but to aggravate differences, and to increaſe diſtinctions into contraſts: but the ſubject will impoſe a caution againſt attempting too much. Art muſt almoſt deſpair of improving a ſcene, where nature ſeems to have exerted her invention.

Practical Treatiſe on Planting and Gardening, p. 593, &c.

§ 2. *Of Factitious Accompaniments.*

These conſiſt of Fences, Walks, Roads, Bridges, Seats, and Buildings.

"I. The FENCE, where the place is large, becomes neceſſary; yet the eye diſlikes conſtraint. Our ideas of liberty carry us beyond our own ſpecies: the imagination feels a diſlike in ſeeing even the brute creation in a ſtate of confinement. The birds wafting themſelves from wood to grove are objects of delight; and the hare appears to enjoy a degree of happineſs unknown to the barriered flock. Beſides, a tall fence frequently hides from the ſight objects the moſt pleaſing; not only the flocks and herds themſelves, but the ſurface they graze upon. Theſe conſiderations have brought the unſeen fence into general uſe.

Ibid.

This ſpecies of barrier it muſt be allowed incurs a degree of deception, which can ſcarcely be warranted upon any other occaſion. In this inſtance, however, it is a ſpecies of fraud which we obſerve in nature's practice: how often have we ſeen two diſtinct herds feeding to appearance in the ſame extended meadow; until coming abruptly upon a deep ſunk rivulet, or an unfordable river, we diſcover the deception.

Beſides the ſunk fence, another ſort of unſeen barrier may be made, though by no means equal to that, eſpecially if near the eye. This is conſtructed of paling, painted of the inviſible green. If the colour of the back-ground were permanent, and that of the paint made exactly to correſpond with it, the deception would at a diſtance be complete; but backgrounds in general changing with the ſeaſon, this kind of fence is the leſs eligible.

Clumps and patches of woodineſs ſcattered promiſcuouſly on either ſide of an unſeen winding fence, aſſiſt very much in doing away the idea of conſtraint. For by this means

> The wand'ring flocks that brouſe between the ſhades,
> Seem oft to paſs their bounds, the dubious eye
> Decides not if they crop the mead or lawn. Mason.

"II. The WALK, in extenſive grounds is as neceſſary as the fence. The beauties of the place are diſcloſed that they may be ſeen; and it is the office of the walk to lead the eye from view to view; in order that whilſt the tone of health is preſerved by the favourite exerciſe of nature, the mind may be thrown into uniſon by the harmony of the ſurrounding objects.

The direction of the walk muſt be guided by the points of view to which it leads, and the nature of the ground it paſſes over: it ought to be made ſubſervient to the natural impediments (the ground, wood, and water) which fall in its way, without appearing to have any direction of its own. It can ſeldom run with propriety any diſtance in a ſtraight line; a thing which rarely occurs in a natural walk. The paths of the negroes and the Indians are always crooked; and thoſe of the brute creation are very ſimilar. Mr Maſon's deſcription of this path of nature is happily conceived.

> The peaſant driving through each ſhadowy lane
> His team, that bends beneath th' incumbent weight
> Of laughing Ceres, marks it with his wheel;
> At night and morn, the milk-maid's careleſs ſtep
> Has, through yon paſture green, from ſtile to ſtile
> Impreſt a kindred curve: the ſcudding hare
> Draws to her dew-ſpent ſeat, o'er thymy heaths,
> A path as gently waving.——— *Eng. Gard.* v. 60.

"III. The ROAD may be a thing of neceſſity, as an approach to the manſion; or a matter of amuſement only, as a drive or a ride, from which the grounds and the ſurrounding country may be ſeen to advantage.

Ibid.

It ſhould be the ſtudy of the artiſt to make the ſame road anſwer, as far as may be, the two-fold purpoſe.

The road and the walk are ſubject to the ſame rule of nature and uſe. The direction ought to be natural and eaſy, and adapted to the purpoſe intended. A road of neceſſity ought to be ſtraighter than one of mere conveniency: in this, recreation is the predominant idea; in that, utility. But even in this the direct line may be diſpenſed with. The natural roads upon heaths and open downs, and the graſſy glades and green roads acroſs foreſts and extenſive waſtes, are proper ſubjects to be ſtudied.

"IV. The BRIDGE ſhould never be ſeen where it is not wanted: a uſeleſs bridge is a deception; deceptions are frauds; and fraud is always hateful, unleſs when practiſed to avert ſome greater evil. A bridge without water is an abſurdity; and half an one ſtuck up as an eye-trap is a paltry trick, which, though it may ſtrike the ſtranger, cannot fail of diſguſting when the fraud is found out.

In low ſituations, and wherever water abounds, bridges become uſeful, and are therefore pleaſing objects: they are looked for; and ought to appear not as objects of ornament only, but likewiſe as matters of utility. The walk or the road therefore ought to be directed in ſuch a manner as to croſs the water at the point in which the bridge will appear to the greateſt advantage.

In the conſtruction of bridges alſo, regard muſt be had to ornament and utility. A bridge is an artificial production, and as ſuch it ought to appear. It ranks among the nobleſt of human inventions; the ſhip and the fortreſs alone excel it. Simplicity and firmneſs are the leading principles in its conſtruction. Mr Wheatley's obſervation is juſt when he ſays, "The ſingle wooden arch, now much in faſhion, ſeems to me generally miſapplied. Elevated without occaſion ſo much above, it is totally detached from the river; it is often ſeen ſtradling in the air, without a glimpſe of water to account for it; and the oſtentation of it as an ornamental object, diverts all that train of ideas which its uſe as a communication might ſuggeſt." But we beg leave to differ from this ingenious writer when he tells us, "that it is ſpoiled if adorned; it is disfigured if only painted of any other than a duſky colour." In a ruſtic ſcene, where Nature wears her own coarſe garb, "the vulgar foot-bridge of planks only guarded on one hand by a common rail, and ſupported by a few ordinary piles," may be in character; but amidſt a diſplay of ornamented nature, a contrivance of that kind would appear mean and paltry; and would be an affectation of ſimplicity rather than the lovely attribute itſelf. In cultivated ſcenes, the bridge ought to receive the ornaments which the laws of architectural taſte allow; and the more poliſhed the ſituation, the higher ſhould be the ſtyle and finiſhings.

"V. SEATS have a two-fold uſe; they are uſeful as places of reſt and converſation, and as guides to the points of view in which the beauties of the ſurrounding ſcene are diſcloſed. Every point of view ſhould be marked with a ſeat; and ſpeaking generally, no ſeat ought to appear but in ſome favourable point of view. This rule may not be invariable, but it ought ſeldom to be deviated from.

Ibid.

In the ruder ſcenes of neglected nature, the ſimple trunk, rough from the woodman's hands, and the butts or ſtools of rooted trees, without any other marks of tools upon them than thoſe of the ſaw which ſevered them from their ſtems, are ſeats in character; and in romantic or recluſe ſituations, the cave or the grotto are admiſſible. But wherever human deſign has been executed upon the natural objects of the place, the ſeat and every other artificial accompaniment ought to be in uniſon; and whether the bench or the alcove be choſen, it ought to be formed and finiſhed in ſuch a manner as to unite with the wood, the lawn, and the walk, which lie around it.

The colour of ſeats ſhould likewiſe be ſuited to ſituations: where uncultivated nature prevails, the natural brown of the wood itſelf ought not to be altered; but where the rural art preſides, white or ſtone colour has a much better effect."

Mr Wheatley's Obſervations reſumed.

"VI. BUILDINGS probably were firſt introduced into gardens merely for convenience, to afford refuge from a ſudden ſhower, and ſhelter againſt the wind; or, at the moſt, to be ſeats for a party; or for retirement. They have ſince been converted into objects, and now the original *uſe* is too often forgotten in the greater purpoſes to which they are applied: they are conſidered as objects only; the inſide is totally neglected, and a pompous edifice frequently wants a room barely comfortable. Sometimes the pride of making a laviſh diſplay to a viſitor without any regard to the owner's enjoyments, and ſometimes too ſcrupulous an attention to the ſtyle of the ſtructure, occaſions a poverty and dullneſs within, which deprive the buildings of part of their utility. But in a garden they ought to be conſidered both as beautiful objects and as agreeable retreats: if a character becomes them, it is that of the ſcene they belong to; not that of their primitive application. A Grecian temple, or Gothic church may adorn ſpots where it would be affectation to preſerve that ſolemnity within which is proper for places of devotion: they are not to be exact models, ſubjects only of curioſity or ſtudy: they are alſo ſeats: and ſuch ſeats will be little frequented by the proprietor; his mind muſt generally be indiſpoſed to ſo much ſimplicity, and ſo much gloom, in the midſt of gaity, richneſs, and variety.

But though the interior of buildings ſhould not be diſregarded, it is by their exterior that they become *objects*; and ſometimes by the one, ſometimes by the other, and ſometimes by both, they are entitled to be conſidered as *characters*.

10
Of buildings intended for objects.

1. As objects, they are deſigned either to *diſtinguiſh*, or to *break*, or to *adorn*, the ſcenes to which they are applied.

The differences between one wood, one lawn, one piece of water, and another, are not always very apparent; the ſeveral parts of a garden would, therefore, often ſeem ſimilar, if they were not diſtinguiſhed by buildings: but theſe are ſo obſervable, ſo obvious at a glance, ſo eaſily retained in the memory, they mark the ſpots where they are placed with ſo much ſtrength, they attract the relation of all around with ſo much power, that parts thus diſtinguiſhed can never be confounded together. Yet it by no means follows, that therefore every ſcene muſt have its edifice; the want of one is ſometimes a variety; and other circumſtances are often ſufficiently characteriſtic: it is only when theſe too nearly agree, that we muſt have recourſe to buildings for differences: we can introduce, exhibit, or contraſt them as we pleaſe: the moſt ſtriking object is thereby made a mark of diſtinction; and the force of this firſt impreſſion prevents our obſerving the points of reſemblance.

Obſerv. on Mod. Gardening.

The uniformity of a view may be broken by ſimilar means, and on the ſame principle: when a wide heath, a dreary moor, or a continued plain, is in proſpect, objects which catch the eye ſupply the want of variety: none are ſo effectual for this purpoſe as buildings. Plantations or water can have no very ſenſible effect, unleſs they are large or numerous, and almoſt change the character of the ſcene: but a ſmall ſingle building diverts the attention at once from the ſameneſs of the extent; which it breaks, but does not divide; and diverſifies, without altering, its nature. The deſign, however, muſt not be apparent. The merit of a cottage applied to this purpoſe, conſiſts in its being free from the ſuſpicion: and a few trees near it will both enlarge the object, and account for its poſition. Ruins are a hackneyed device immediately detected, unleſs their ſtyle be ſingular, or their dimenſions extraordinary. The ſemblance of an ancient Britiſh monument might be adapted to the ſame end, with little trouble and great ſucceſs. The materials might be brick, or even timber plaſtered over, if ſtone could not eaſily be produced: whatever they were, the fallacy would not be diſcernible; it is an object to be ſeen at a diſtance, rude, and large, and in character agreeable to a wild open view. But no building ought to be introduced, which may not in reality belong to ſuch a ſituation: no Grecian temples, no Turkiſh moſques, no Egyptian obeliſks, or pyramids; none imported from foreign countries, and unuſual here. The apparent artifice would deſtroy an effect, which is ſo nice as to be weakened, if objects proper to produce it are diſplayed with too much oſtentation; if they ſeem to be contrivances, not accidents; and the advantage of their poſition appear to be more laboured than natural.

But in a garden, where objects are intended only to adorn, every ſpecies of architecture may be admitted, from the Grecian down to the Chineſe; and the choice is ſo free, that the miſchief moſt to be apprehended is an abuſe of this latitude in the multiplicity of buildings. Few ſcenes can bear more than two or three: in ſome, a ſingle one has a greater effect than any number: and a careleſs glimpſe, here and there, of ſuch as belong immediately to different parts, frequently enliven the landſcape with more ſpirit than thoſe which are induſtriouſly ſhown. If the effect of a partial ſight, or a diſtant view, were more attended to, many ſcenes might be filled, without being crowded; a greater number of buildings would be tolerated, when they ſeemed to be caſual, not forced; and the animation, and the richneſs of the objects, might be had without pretence or diſplay.

Too fond an oſtentation of buildings, even of theſe which are principal, is a common error; and when all is done, they are not always ſhown to the greateſt advantage. Though their ſymmetry and their beauties ought in general to be diſtinctly and fully ſeen, yet an oblique is ſometimes better than a direct view: and they are often leſs agreeable objects when entire, than when a part is covered, or their extent is interrupted; when they are boſomed in wood, as well as backed by it; or appear between the ſtems of trees which riſe before or above them; thus thrown into perſpective, thus grouped and accompanied, they may be as important as if they were quite expoſed, and are frequently more pictureſque and beautiful.

But a ſtill greater advantage ariſes from this management, in connecting them with the ſcene: they are conſiderable, and different from all around them: inclined therefore to ſeparate from the reſt: and yet they are ſometimes ſtill more detached by the pains taken to exhibit them: that very importance which is the cauſe of the diſtinction ought to be a reaſon for guarding againſt the independence to which it is naturally prone, and by which an object, which ought to be a part of the whole, is reduced to a mere individual. An elevated is generally a noble ſituation. When it is a point or a pinnacle, the ſtructure may be a continuation of the aſcent; and on many occaſions, ſome parts of the building may deſcend lower than others, and multiply the appearances of connection: but an edifice in the midſt of an extended ridge, commonly ſeems naked alone, and impoſed upon the brow, not joined to it. If wood, to accompany it, will not grow there, it had better be brought a little way down the declivity; and then all behind, above, and about it, are ſo many points of contact, by which it is incorporated into the landſcape.

Accompaniments are important to a building; but they loſe much of their effect when they do not appear to be caſual. A little mount juſt large enough for it; a ſmall piece of water below, of no other uſe than to reflect it; and a plantation cloſe behind, evidently placed there only to give it relief; are as artificial as the ſtructure itſelf, and alienate it from the ſcene of nature into which it is introduced, and to which it ought to be reconciled. Theſe appendages therefore ſhould be ſo diſpoſed, and ſo connected with the adjacent parts, as to anſwer other purpoſes, though applicable to this: that they may be bonds of union, not marks of difference; and that the ſituation may appear to have been choſen at the moſt, not made, for the building.

In the choice of a ſituation, that which ſhows the building beſt ought generally to be preferred: eminence, relief, and every other advantage which can be, ought to be given to an object of ſo much conſideration: they are for the moſt part deſirable; ſometimes neceſſary; and exceptionable only when, inſtead of riſing out of the ſcene, they are forced into it, and a contrivance to procure them at any rate is avowed without any diſguiſe. There are, however, occaſions, in which the moſt tempting advantages of ſituation muſt be waved; the general compoſition may forbid a building in one ſpot, or require in in another; at other times, the intereſt of the particular groupe it belongs to, may exact a ſacrifice of the opportunities to exhibit its beauties and importance : and at all times, the pretenſions of every individual object muſt give way to the greater effect of the whole.

Ibid. 11 Of thoſe expreſſive of character.

2. The ſame ſtructure which adorns as an object, may alſo be expreſſive as a *character*. Where the former is not wanted, the latter may be deſirable : or it may be weak for one purpoſe, and ſtrong for the other ; it may be grave, or gay ; magnificent, or ſimple ; and, according to its ſtyle, may or may not be agreeable to the place it is applied to. But mere conſiſtency is not all the merit which buildings can claim : their characters are ſometimes ſtrong enough to *determine*, *improve*, or *correct*, that of the ſcene : and they are ſo conſpicuous, and ſo diſtinguiſhed, that whatever force they have is immediately and ſenſibly felt. They are fit therefore to make a firſt impreſſion ; and when a ſcene is but faintly characteriſed, they give at once a caſt which ſpreads over the whole, and which the weaker parts concur to ſupport, though perhaps they were not able to produce it.

Nor do they ſtop at fixing an uncertainty, or removing a doubt ; they raiſe and enforce a character already marked : a temple adds dignity to the nobleſt, a cottage ſimplicity to the moſt rural, ſcenes ; the lightneſs of a ſpire, the airineſs on an open rotunda, the ſplendor of a continued colonnade, are leſs ornamental than expreſſive ; others improve cheerfulneſs into gaiety, gloom into ſolemnity, and richneſs into profuſion : a retired ſpot, which might have been paſſed unobſerved, is noticed for its tranquillity, as ſoon as it is appropriated by ſome ſtructure to retreat ; and the moſt unfrequented place ſeems leſs ſolitary than one which appears to have been the haunt of a ſingle individual, or even of a ſequeſtered family, and is marked by a lonely dwelling, or the remains of a deſerted habitation.

The means are the ſame, the application of them only is different, when buildings are uſed to correct the character of the ſcene ; to enliven its dulneſs, mitigate its gloom, or to check its extravagance ; and, on a variety of occaſions, to ſoften, to aggravate, or to counteract, particular circumſtances attending it. But care muſt be taken that they do not contradict too ſtrongly the prevailing idea : they may leſſen the drearineſs of a waſte, but they cannot give it amenity ; they may abate horrors, but they will never convert them into graces ; they may make a tame ſcene agreeable, and even intereſting, not romantic ; or turn ſolemnity into cheerfulneſs, but not into gaiety. In theſe, and in many other inſtances, they correct the character, by giving it an inclination towards a better, which is not very different ; but they can hardly alter it entirely : when they are totally inconſiſtent with it, they are at the beſt nugatory.

The great effects which have been aſcribed to buildings do not depend upon thoſe trivial ornaments and appendages which are often too much relied on ; ſuch as the furniture of a hermitage, painted glaſs in a Gothic church, and ſculpture about a Grecian temple ; groteſque or bacchanalian figures to denote gaiety, and death's-heads to ſignify melancholy. Such devices are only deſcriptive, not expreſſive, of character ; and muſt not be ſubſtituted in the ſtead of thoſe ſuperior properties, the want of which they acknowledge, but do not ſupply. They beſides often require time to trace their meaning, and to ſee their application ; but the peculiar excellence of buildings is, that their effects are inſtantaneous, and therefore the impreſſions they make are forcible. In order to produce ſuch effects, the general ſtyle of the ſtructure, and its poſition, are the principal conſiderations: either of them will ſometimes be ſtrongly characteriſtic alone ; united, their powers are very great ; and both are ſo important, that if they do not concur, at leaſt they muſt not contradict one another.

12 Species and ſituations of buildings.

Every branch of architecture furniſhes, on different occaſions, objects proper for a garden ; and there is no reſtraint on our ſelection, provided it be conformable to the ſtyle of the ſcene, proportioned to its extent, and agreeable to its character.

The choice of ſituations is alſo very free. A hermitage, indeed, muſt not be cloſe to a road ; but whether it be expoſed to view on the ſide of a mountain, or concealed in the depth of a wood, is almoſt a matter of indifference ; that it is at a diſtance from public reſort is ſufficient. A caſtle muſt not be ſunk in a bottom ; but that it ſhould ſtand on the utmoſt pinnacle of a hill, is not neceſſary : on a lower knole, and backed by the riſe, it may appear to greater advantage as an object, and be much more important to the general compoſition. Many buildings, which from their ſplendor beſt become an open expoſure, will yet be ſometimes not ill beſtowed on a more ſequeſtered ſpot, either to characteriſe or adorn it ; and others, for which a ſolitary would in general be preferred to an eminent ſituation, may occaſionally be objects in very conſpicuous poſitions. A Grecian temple, from its peculiar grace and dignity, deſerves every diſtinction ; it may, however, in the depth of a wood, be ſo circumſtanced, that the want of thoſe advantages to which it ſeems intitled will not be regretted. A happier ſituation cannot be deviſed, than that of the temple of Pan on the ſouth lodge on Enfield chace. It is of the uſual oblong form, encompaſſed by a colonnade ; in dimenſions, and in ſtyle, it is equal to a moſt extenſive landſcape : and yet the antique and ruſtic air of its Doric columns without baſes ; by the chaſtity of its little ornaments, a crook, a pipe, and a ſcrip, and thoſe only over the doors ; and by the ſimplicity of the whole both within and without ; it is adapted with ſo much propriety to the thickets which conceal it from the view, that no one can wiſh it to be brought forward, who is ſenſible to the charms of the Arcadian ſcene which this building alone has created. On the other hand, a very ſpacious field, or ſheep-walk, will not be diſgraced by a farm-houſe, a cottage, or a Dutch barn ; nor will they, though ſmall and familiar, appear to be inconſiderable or inſignificant objects. Numberleſs other inſtances might be adduced to prove the impoſſibility of reſtraining particular buildings to particular ſituations, upon any general principles : the variety in their forms is hardly greater than in their application. Only let not their uſes be diſguiſed, as is often abſurdly attempted with the humbler kinds. "A barn * dreſſed up in the habit of a country-church, or a farm-houſe figuring away in the fierceneſs of a caſtle, are ridiculous deceptions. A landſcape daubed upon a board, and a wooden ſteeple ſtuck up in a wood, are beneath contempt."

Temples, thoſe favourite and moſt coſtly objects in gardens, too generally merit cenſure for their inutility,

* *Planting and Gardening*, p. 598.

their profuſion, or the impropriety of their purpoſe. "Whether they be dedicated to Bacchus, Venus, Priapus, or any other demon of debauchery, they are in this age, enlightened with regard to theological and ſcientific knowledge, equally abſurd. Architecture, in this part of its ſphere, may more nobly, and with greater beauty and effect, be exerciſed upon a chapel, a mauſoleum, a monument, judiciouſly diſpoſed among the natural ornaments. The late Sir William Harbord, has given us a model of the firſt kind, at Gunton, in Norfolk; the pariſh-church ſtanding in his park, and being, an old unſightly building, he had it taken down, and a beautiful temple, under the direction of the Adams's erected upon its ſite for the ſame ſacred purpoſe:—The mauſoleum at Caſtle-Howard, in Yorkſhire, the ſeat of the earl of Carliſle, is a noble ſtructure:—And as an inſtance of the laſt ſort, may be mentioned the Temple of Concord and Victory at Stowe, erected to the memory of the great Lord Chatham and his glorious war; a beautiful monumental building, ſuited to the greatneſs of the occaſion."

Ibid. p. 599

To the great variety abovementioned muſt be added, Mr Wheatley obſerves, the many changes which may be made by the means of ruins. They are a claſs by themſelves, beautiful as objects, expreſſive as characters, and peculiarly calculated to connect with appendages into elegant groupes. They may be accommodated with eaſe to irregularity of ground, and their diſorder is improved by it. They may be intimately blended with trees and thickets; and the interruption is an advantage: for imperfection and obſcurity are their properties; and to carry the imagination to ſomething greater than is ſeen, is their effect. They may for any of theſe purpoſes be ſeparated into detached pieces; contiguity is not neceſſary, nor even the appearance of it, if the relation be preſerved; but ſtraggling ruins have a bad effect, when the ſeveral parts are equally conſiderable. There ſhould be one large maſs to raiſe an idea of greatneſs, to attract the others about it, and to be a common centre of union to all: the ſmaller pieces then mark the original dimenſions of one extenſive ſtructure; and no longer appear to be the remains of ſeveral little buildings.

Obſervations on Mod. Gardening.

All remains excite an inquiry into the former ſtate of the edifice, and fix the mind in a contemplation of the uſe it was applied to; beſides the characters expreſſed by their ſtyle and poſition, they ſuggeſt ideas which would not ariſe from the buildings if entire. The purpoſes of many have ceaſed: an abbey, or a caſtle, if complete, can now be no more than a dwelling; the memory of the times, and of the manners to which they are adapted, is preſerved only in hiſtory, and in ruins; and certain ſenſations of regret, of veneration, or compaſſion, attend the recollection. Nor are theſe confined to the remains of buildings which are now in diſuſe: thoſe of an old manſion raiſe reflections on the domeſtic comforts once enjoyed, and the ancient hoſpitality which reigned there. Whatever building we ſee in decay, we naturally contraſt its preſent to its former ſtate, and delight to ruminate on the compariſon. It is true that ſuch effects properly belong to real ruins; they are however produced in a certain degree by thoſe which are fictitious: the impreſſions are not ſo ſtrong, but they are exactly ſimilar; and the repreſentation, though it does not preſent facts to the memory, yet ſuggeſts ſubjects to the imagination. But, in order to affect the fancy, the ſuppoſed original deſign ſhould be clear, the uſe obvious, and the form eaſy to be traced: no fragments ſhould be hazarded without a preciſe meaning, and an evident connection; none ſhould be perplexed in their conſtruction, or uncertain as to their application. Conjectures about the form, raiſe doubts about the exiſtence of the ancient ſtructure: the mind muſt not be allowed to heſitate; it muſt be hurried away from examining into the reality, by the exactneſs and the force of the reſemblance.

In the ruins of Tintern abbey †, the original conſtruction, of the church is perfectly marked; and it is principally from this circumſtance that they are celebrated as a ſubject of curioſity and contemplation. The walls are almoſt entire; the roof only is fallen in, but moſt of the columns which divided the ayles are ſtill ſtanding: of thoſe which have dropped down, the baſes remain, every one exactly in its place: and in the middle of the nave four lofty arches, which once ſupported the ſteeple, riſe high in the air above all the reſt, each reduced now to a narrow rim of ſtone, but completely preſerving its form. The ſhapes even of the windows are little altered: but ſome of them are quite obſcured, others partially ſhaded, by tufts of ivy; and thoſe which are moſt clear, are edged with its ſlender tendrils, and lighter foliage, wreathing about the ſides and the diviſions: it winds round the pillars; it clings to the walls; and in one of the ayles cluſters at the top in bunches, ſo thick and ſo large as to darken the ſpace below. The other ayles, and the great nave, are expoſed to the ſky: the floor is entirely overſpread with turf; and to keep it clear from weeds and buſhes, is now its higheſt preſervation. Monkiſh tomb-ſtones, and the monuments of benefactors long ſince forgotten, appear above the green ſward; the baſes of the pillars which have fallen, riſe out of it; and maimed effigies, and ſculpture worn with age and weather, Gothic capitals, carved cornices, and various fragments, are ſcattered about, or lie in heaps piled up together. Other ſhattered pieces, though disjointed and mouldering, ſtill occupy their original places; and a ſtair-caſe much impaired, which led to a tower now no more, is ſuſpended at a great height, uncovered and inacceſſible. Nothing is perfect; but memorials of every part ſtill ſubſiſt: all certain, but all in decay; and ſuggeſting at once every idea which can occur in a ſeat of devotion, ſolitude, and deſolation. Upon ſuch models, fictitious ruins ſhould be formed: and if any parts are entirely loſt, they ſhould be ſuch as the imagination can eaſily ſupply from thoſe which are ſtill remaining. Diſtinct traces of the building which is ſuppoſed to have exiſted, are leſs liable to the ſuſpicion of artifice, than an unmeaning heap of confuſion. Preciſion is always ſatisfactory, but in the reality it is only agreeable; in the copy it is eſſential to the imitation.

A material circumſtance to the truth of the imitation is, that the ruins appear to be very old. The idea is beſides intereſting in itſelf: a monument of antiquity is never ſeen with indifference; and a ſemblage of age may be given to the repreſentation by the hue of the materials, the growth of ivy and other plants, and

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† Between Chepſtow and Monmouth.

Ibid.

cracks and fragments ſeemingly occaſioned rather by decay than by deſtruction. An appendage evidently more modern than the principal ſtructure will ſometimes corroborate the effect: the ſhed of a Cottager amidſt the remains of a temple, is a contraſt both to the former and to the preſent ſtate of the building; and a tree flouriſhing among ruins, ſhows the length of time they have lain neglected. No circumſtance ſo forcibly marks the deſolation of a ſpot once inhabited, as the prevalence of nature over it:

Campos ubi Troja fuit.

is a ſentence which conveys a ſtronger idea of a city totally overthrown, then a deſcription of its remains; but in a repreſentation to the eye, ſome remains muſt appear; and then the perverſion of them to an ordinary uſe, or an intermixture of a vigorous vegetation, intimates a ſettled diſpair of their reſtoration.

SECT. II. *Principles of Selection and Arrangement in the Subjects of Gardening.*

Planting and Gardening, p. 602.

I. Of ART. In the lower claſſes of rural improvements, art ſhould be ſeen as little as may be; and in the more negligent ſcenes of nature, every thing ought to appear as if it had been done by the general laws of nature, or had grown out of a ſeries of fortuitous circumſtances. But in the higher departments, art cannot be hid; and the *appearance* of deſign ought not to be excluded. A human production cannot be made perfectly natural; and held out as ſuch it becomes an impoſition. Our art lies in endeavouring to adapt the productions of nature to human taſte and perceptions; and if much art be uſed, do not *attempt* to hide it. Art ſeldom fails to pleaſe when executed in a maſterly manner: nay, it is frequently the deſign and execution, more than the production itſelf, that ſtrikes us. It is the artifice, not the deſign, which ought to be avoided. It is the labour and not the art which ought to be concealed. The rural artiſt ought, therefore, upon every occaſion, to endeavour to avoid labour; or, if indiſpenſably neceſſary, to conceal it. No trace ſhould be left to lead back the mind to the expenſive toil. A mound raiſed, a mountain levelled, or a uſeleſs temple built, convey to the mind feelings equally diſguſting.

13
Of Scenery
Ibid.

II. PICTURESQUE BEAUTY. Though the aids of art are as eſſential to gardening, as education is to manners; yet art may do too much: ſhe ought to be conſidered as the hand-maid, not as the miſtreſs, of nature; and whether ſhe be employed in carving a tree into the figure of an animal, or in ſhaping a view into the form of a picture, ſhe is equally culpable. The nature of the place is ſacred. Should this tend to landſcape, from ſome principal point of view, aſſiſt nature and perfect it; provided this can be done without injuring the views from other points. But do not disfigure the natural features of the place:—do not ſacrifice its native beauties, to the arbitrary laws of landſcape painting.

> Great Nature ſcorns controul; ſhe will not bear
> One beauty foreign to the ſpot or ſoil
> She gives thee to adorn: 'Tis thine alone
> To mend, not change her features. MASON.

Nature ſcarcely knows the thing mankind call a *landſcape*. The landſcape-painter ſeldom, if ever, finds it perfected to his hands;—ſome addition or alteration is almoſt always wanted. Every man who has made his obſervations upon natural ſcenery, knows that the miſletoe of the oak occurs almoſt as often as a perfect natural landſcape; and to attempt to make up artificial landſcape upon every occaſion is unnatural and abſurd.

If, indeed, the eye were fixed in one point, the trees could be raiſed to their full height at command, and the ſun be made to ſtand ſtill,—the rural artiſt might work by the rules of light and ſhade, and compoſe his landſcape by the painter's law. But whilſt the ſun continues to pour forth its light impartially, and the trees to riſe with ſlow progreſſion, it would be ridiculous to attempt it. Let him rather ſeek out, imitate and aſſociate, ſuch ſtriking paſſages in nature as are immediately applicable to the place to be improved, with regard to rules of landſcape, merely human;—and let him,

> ————————in this and all
> Be various, wild, and free, as Nature's ſelf. MASON.

Inſtead of ſacrificing the natural beauties of the place to one formal landſcape, let every ſtep diſcloſe freſh charms unſought for.

Wheatlay's Obſervations
14
Of emblematical characters.

III. Of CHARACTER. Character is very reconcileable with beauty; and, even when independent of it, has attracted ſo much regard, as to occaſion ſeveral frivolous attempts to produce it: ſtatues, inſcriptions, and even paintings, hiſtory and mythology, and a variety of devices, have been introduced for this purpoſe. The heathen deities and heroes have therefore had their ſeveral places aſſigned to them in the woods and the lawns of a garden: natural caſcades have been disfigured with river-gods, and columns erected only to receive quotations; the compartiments of a ſummer-houſe have been filled with pictures of gambols and revels, as ſignificant of gaiety; the cypreſs, becauſe it was once uſed in funerals, has been thought peculiarly adapted to melancholy; and the decorations, the furniture, and the environs of a building, have been crowded with puerilities under pretence of propriety. All theſe devices are rather *emblematical* than expreſſive: they may be ingenious contrivances, and recal abſent ideas to the recollection; but they make no immediate impreſſion: for they muſt be examined, compared, perhaps explained, before the whole deſign of them is well underſtood. And though an alluſion to a favourite or well known ſubject of hiſtory, of poetry, or of tradition, may now and then animate or dignify a ſcene; yet as the ſubject does not naturally belong to a garden, the alluſion ſhould not be principal: it ſhould ſeem to have been ſuggeſted by the ſcene; a tranſitory image, which irreſiſtibly occurred; not ſought for, not laboured; and have the force of metaphor, free from the detail of an allegory.

15
Of imitative characters.

Another ſpecies of character ariſes from direct *imitation*; when a ſcene or an object, which has been celebrated in deſcription, or is familiar in idea, is repreſented in a garden. Artificial ruins, lakes, and rivers, fall under this denomination. The air of a ſeat extended to a diſtance, and ſcenes calculated to raiſe ideas of Arcadian elegance of a rural ſimplicity, with many more which have been occaſionally mentioned or will obviouſly occur, may be ranked in this claſs. They are all repreſentations. But the materials, the dimenſions, and other circumſtances, being the ſame in the copy and the original, their effects are ſimilar in both: and if not equally ſtrong, the defect is not in the reſemblance; but the conſciouſneſs of an imitation checks that train of thought which the appearance naturally ſuggeſts, yet an over-anxious ſolicitude to diſguiſe the fallacy is often the means of expoſing it: too many points of likeneſs ſometimes hurt the deception; they ſeem ſtudied and forced; and the affectation of reſemblance deſtroys the ſuppoſition of a reality. A hermitage is the habitation of a recluſe; it ſhould be diſtinguiſhed by its ſolitude, and its ſimplicity: but if it is filled with crucifixes, hour-glaſſes, beads, and every other trinket which can be thought of, the attention is diverted from enjoying the retreat to examining the particulars: all the collateral circumſtances which agree with a character, ſeldom meet in one ſubject; and when they were induſtrouſly brought together, though each be natural, the collection is artificial.

16
Of original characters.

But the art of gardening aſpires to more than imitation: it can create *original* characters, and give expreſſions to the ſeveral ſcenes ſuperior to any they can receive from alluſions. Certain properties, and certain diſpoſitions, of the objects of nature, are adapted to excite particular ideas and ſenſations: many of them have been occaſionally mentioned, and all are very well known. They require no diſcernment, examination, or diſcuſſion; but are obvious at a glance, and inſtantaneouſly diſtinguiſhed by our feelings. Beauty alone is not ſo engaging as this ſpecies of character: the impreſſions it makes are more tranſient and leſs intereſting; for it aims only at delighting the eye, but the other affects our ſenſibility. An aſſemblage of the moſt elegant forms in the happieſt ſituations is to a degree indiſcriminate, if they have not been ſelected and arranged with a deſign to produce certain expreſſions; an air of magnificence, or of ſimplicity, of cheerfulneſs, tranquillity, or ſome other general character, ought to pervade the whole; and objects pleaſing in themſelves, if they contradict that character, ſhould therefore be excluded: thoſe which are only indifferent, muſt ſometimes make room for ſuch as are more ſignificant; many will often be introduced for no other merit than their expreſſion; and ſome, which are in general rather diſagreeable, may occaſionally be recommended by it. Barrenneſs itſelf may be an acceptable circumſtance in a ſpot dedicated to ſolitude and melancholy.

The power of ſuch characters is not confined to the ideas which the objects immediately ſuggeſt; for theſe are connected with others, which inſenſibly lead to ſubjects far diſtant perhaps from the original thought, and related to it only by a ſimilitude in the ſenſations they excite. In a proſpect enriched and enlivened with inhabitants and cultivation, the attention is caught at firſt by the circumſtances which are gayeſt in their ſeaſon, the bloom of an orchard, the feſtivity of a hay-field, and the carols of harveſt-home; but the cheerfulneſs which theſe infuſe into the mind, expands afterwards to other objects than thoſe immediately preſented to the eye; and we are thereby diſpoſed to receive, and delighted to purſue, a variety of pleaſing ideas, and every benevolent feeling. At the ſight of a ruin, reflections on the change, the decay, and the deſolation before us, naturally occur; and they introduce a long ſucceſſion of others, all tinctured with that melancholy which theſe have inſpired; or if the monument revive the memory of former times, we do not ſtop at the ſimple fact which it records, but recollect many more coeval circumſtances, which we ſee, not perhaps as they were, but as they are come down to us, venerable with age, and magnified by fame. Even without the aſſiſtance of buildings or other adventitious circumſtances, nature alone furniſhes materials for ſcenes which may be adapted to almoſt every kind of expreſſion: their operation is general, and their conſequences are infinite: the mind is elevated, depreſſed, or compoſed, as gaiety, gloom, or tranquillity, prevails in the ſcene; and we ſoon looſe ſight of the means by which the character is formed; we forget the particular objects it preſents; and giving way to their effects, without recurring to the cauſe, we follow the track they have begun, to any extent which the diſpoſition they accord with will allow. It ſuffices that the ſcenes of nature have a power to affect our imagination and our ſenſibility; for ſuch is the conſtitution of the human mind, that if once it is agitated, the emotion ſpreads far beyond the occaſion; when the paſſions are rouſed, their courſe is unreſtrained; when the fancy is on the wing, its flight is unbounded; and, quitting the inanimate objects which firſt gave them their ſpring, we may be led by thought above thought, widely differing in degree, but ſtill correſponding in character, till we riſe from familiar ſubjects up to the ſublimeſt conceptions, and are rapt in the contemplation of whatever is great or beautiful, which we ſee in nature, feel in man, or attribute to divinity.

IV. GENERAL ARRANGEMENT. Notwithſtanding the nature of the place, as already obſerved, ought not be ſacrificed to the manſion;—the houſe muſt ever be allowed to be a principal in the compoſition. It ought to be conſidered as the centre of the ſyſtem; and the rays of art, like thoſe of the ſun, ſhould grow fainter as they recede from the centre. The houſe itſelf being entirely a work of art, its immediate environs ſhould be highly finiſhed; but as the diſtance increaſes, the appearance of deſign ſhould gradually diminiſh, until nature and fortuitouſneſs have full poſſeſſion of the ſcene.

Pract. Treat. on Planting and Gardening.

In general, the approach ſhould be to the back-front, which, in ſuitable ſituations, ought to lie open to the paſture-grounds. On the ſides more highly ornamented, a well-kept gravel-walk may embrace the walls; to this the ſhaven lawn and ſhrubbery ſucceed; next, the grounds cloſely paſtured; and, laſtly, the ſurrounding country, which ought not to be conſidered as out of the artiſt's reach: for his art conſiſts not more in decorating particular ſpots, than in endeavouring to render the whole face of nature delightful.

Another reaſon for this mode of arrangement is, objects immediately under the eye are ſeen more diſtinctly than thoſe at a diſtance, and ought to be ſuch as are pleaſing in the detail. The beauties of a flower can be diſcerned on a near view only; whilſt at a diſtance a roughet of coppice wood, and the moſt elegant arrangement

Ibid. p. 606.

rangement of flowering-ſhrubs have the ſame effect. The moſt rational entertainment the human mind is capable of receiving, is that of obſerving the operations of nature. The foliation of a leaf, the blowing of flowers, and the maturation of fruit, are among the moſt delightful ſubjects that a contemplative mind can be employed in. Theſe proceſſes of nature are ſlow; and except the object fall ſpontaneouſly under the eye of the obſerver, the inconveniences of viſiting it in a remote part, ſo far interfere with the more important employments of life, as to blunt, if not deſtroy, the enjoyment. This is a ſtrong argument in favour of ſhrubs and flowers being planted under or near our windows, eſpecially thoſe from whence they may be viewed during the hours of leiſure and tranquillity.

Further, the vegetable creation being ſubject to the animal, the ſhrub may be cropt, or the flower trodden down in its day of beauty. If therefore we wiſh to converſe with nature in private, intruders muſt be kept off,—the ſhrubbery be ſevered from the ground;—yet not in ſuch a manner as to drive away the paſturing ſtock from our ſight. For this reaſon, the ſhaven lawn ought not to be too extenſive, and the fence which incloſes it ſhould be ſuch as will not interrupt the view: but whether it be ſeen or unſeen, ſuſpected or unſuſpected, is a matter of no great import: its utility in protecting the ſhrubs and flowers,—in keeping the horns of the cattle from the window, and the feet of the ſheep from the gravel and broken ground,—in preſerving that neatneſs on the outſide, which ought to correſpond with the finiſhings and furniture within,—render it of ſufficient importance to become even a part of the ornament.

PART II. EXECUTION of the GENERAL SUBJECTS.

IMPROVEMENTS in general may be claſſed under the following heads: The *Hunting-Box*, The *Ornamented Cottage*, the *Villa*, and the *Principal Reſidence*.

But before any ſtep can be taken towards the execution of the deſign, be it large or ſmall, a map or plan of the place, exactly as it lies in its unimproved ſtate, ſhould be made; with a correſponding ſketch, to mark the intended improvements upon. Not a hovel nor a twig ſhould be touched, until the artiſt has ſtudied maturely the natural abilities of the place, and has decidedly fixed in his mind, and finally ſettled on his plan, the propoſed alterations: and even then, let him "dare with caution."

1. *Of Improvements adapted to a* HUNTING-BOX.

HERE art has little to do. Hunting may be called the amuſement of nature; and the place appropriated to it ought to be no farther altered from its natural ſtate than decency and conveniency require:—With men who live in the preſent age of refinement, "a want of decency is a want of ſenſe."

Ibid. p. 610, &c.

The ſtyle throughout ſhould be *maſculine*. If ſhrubs be required, they ſhould be of the hardier ſorts; the box, the holly, the lauruſtinus. The trees ſhould be the oak and the beech, which give in autumn an agreeable variety of foilage, and anticipate as it were the ſeaſon of diverſion. A ſuite of paddocks ſhould be ſeen from the houſe; and if a view of diſtant covers can be caught, the back-ground will be complete. The ſtable, the kennel, and the leaping-bar, are the factitious accompaniments; in the conſtruction of which ſimplicity, ſubſtantialneſs, and conveniency, ſhould prevail.

2. *Of the Styles of an* ORNAMENTED COTTAGE.

NEATNESS and ſimplicity ought to mark the ſtyle of this rational retreat. Oſtentation and ſhow ſhould be cautiouſly avoided; even elegance ſhould not be attempted; though it may not be hid, if it offer itſelf ſpontaneouſly.

Nothing, however, ſhould appear vulgar; nor ſhould ſimplicity be pared down to baldneſs; every thing whimſical or expenſive ought to be ſtudiouſly avoided;—chaſteneſs and frugality ſhould appear in every part.

Near the houſe a ſtudied neatneſs may take place; but at a diſtance, negligence ſhould rather be the characteriſtic.

If a taſte for botany lead to a collection of native ſhrubs and flowers, a ſhrubbery will be requiſite; but in this every thing ſhould be native. A gaudy exotic ought not to be admitted; nor ſhould the lawn be kept cloſe ſhaven; its flowers ſhould be permitted to blow; and the herbage, when mown, ought to be carried off, and applied to ſome uſeful purpoſe.

In the artificial accompaniments, ornament muſt be ſubordinate; utility muſt preſide. The buildings, if any appear, ſhould be thoſe in actual uſe in rural economics. If the hovel be wanted, let it appear; and, as a ſide-ſcreen, the barn and rick-yard are admiſſible; whilſt the dove-houſe and poultry-yard may enter more freely into the compoſition.

In fine, the ornamented cottage ought to exhibit cultivated nature in the firſt ſtage of refinement. It ranks next above the farm-houſe. The plain garb of ruſticity may be ſet off to advantage; but the ſtudied dreſs of the artiſt ought not to appear. That becoming neatneſs, and thoſe domeſtic conveniences, which render the rural life agreeable to a cultivated mind, are all that ſhould be aimed at.

3. *Of the Embelliſhments of a* VILLA.

THIS demands a ſtyle very different from the preceding. It ought to be elegant, rich or grand, according to the ſtyle of the houſe itſelf, and the ſtate of the ſurrounding country; the principal buſineſs of the artiſt being to connect theſe two in ſuch a manner, that the one ſhall not appear naked or flareing, nor the other deſolate and inhoſpitable.

If the houſe be ſtately, and the adjacent country rich and highly cultivated, a ſhrubbery may intervene, in which art may ſhow her utmoſt ſkill. Here, the artiſt may even be permitted to play at landſcape: for a place of this kind being ſuppoſed to be ſmall, the purpoſe principally ornamental, and the point of view probably confined ſimply to the houſe, ſide ſcreens may be formed, and a fore-ground laid out ſuitable to the beſt diſtance that can be caught.

If buildings or other artificial ornaments abound in the offſcape, ſo as to mark it ſtrongly, they ought alſo to appear more or leſs in the fore-ground: if the diſtance abound with wood, the fore-ground ſhould be thickened, leſt baldneſs ſhould offend; if open and naked, elegance rather than richneſs ought to be ſtudied, leſt heavineſs ſhould appear.

Ibid.

It is far from being any part of our plan to cavil unneceſſarily at artiſts, whether living or dead; we cannot, however, refrain from expreſſing a concern for the almoſt total neglect of the principles here in ornamenting the vicinages of villas. It is to be regretted, that in the preſent practice theſe principles ſeem to be generally loſt ſight of. Without any regard to uniting the houſe with the adjacent country, and, indeed, ſeemingly without any regard whatever to the offſcape, one invariable plan of embelliſhment prevails; namely, that of ſtripping the fore-ground entirely naked, or nearly ſo, and ſurrounding it with a wavy border of ſhrubs and a gravel walk; leaving the area, whether large or ſmall, one naked ſheet of green ſward.

In ſmall confined ſpots, this plan may be eligible. But a ſimple border round a large unbroken lawn only ſerves to ſhow what more is wanted. Simplicity in general is pleaſing; but even ſimplicity may be carried to an extreme, ſo as to convey no other idea than that of poverty and baldneſs. Beſides, how often do we ſee in natural ſcenery, the holly and the fox-glove flouriſhing at the foot of an oak, and the primroſe and the campion adding charms to the hawthorn ſcattered over the paſtured lawn? And we conceive that ſingle trees footed with evergreens and native flowers, and clumps as well as borders of ſhrubs, are admiſſible in ornamental as well as in natural ſcenery.

The ſpecies of ſhrub will vary with the purpoſe. If the principal intention be a winter retreat, evergreens and the early-blowing ſhrubs ſhould predominate; but in a place to be frequented in ſummer and autumn, the deciduous tribes ought chiefly to be planted.

4. *Of the* Principal Residence.

Here the whole art centers. The artiſt has here full ſcope for a diſplay of taſte and genius. He has an extent of country under his eye, and will endeavour to make the moſt of what nature and accident have ſpread before him.

Round a principal reſidence, a gentleman may be ſuppoſed to have ſome conſiderable eſtate, and it is not a ſhrubbery and a ground only which fall under the conſideration of the artiſt: he ought to endeavour to diſcloſe to the view, either from the houſe or ſome other point, as much as he conveniently can of the adjacent eſtate. The love of poſſeſſion is deeply planted in every man's breaſt; and places ſhould bow to the gratification of their owners. To curtail the view by an artificial ſide ſcreen, or any other unnatural machinery, ſo as to deprive a man of the ſatisfaction of over-looking his own eſtate, is an abſurdity which no artiſt ought to be permitted to be guilty of. It is very different, however, where the property of another intrudes upon the eye: Here the view may, with ſome colour of propriety, be bounded by a woody ſcreen.

The grounds, however, by a proper management, may be made independent of whatever is external; and though proſpects are no where more delightful than from a point of view which is alſo a beautiful ſpot, yet if in the environs of ſuch a garden they ſhould be wanting, the elegant, pictureſque, and various ſcenes within itſelf, almoſt ſupply the deficiency.

Mr Wheatley's deſcription of Stowe gardens.

"This (ſays Mr Wheatley) is the character of the gardens at Stowe: for there the views in the country are only circumſtances ſubordinate to the ſcenes; and the principal advantage of the ſituation is the variety of the ground within the incloſure. The houſe ſtands on the brow of a gentle aſcent; part of the gardens lie on the declivity, and ſpread over the bottom beyond it: this eminence is ſeparated by a broad winding valley from another which is higher and ſteeper; and the deſcents of both are broken by large dips and hollows, ſloping down the ſides of the hills. The whole ſpace is divided into a number of ſcenes, each diſtinguiſhed with taſte and fancy; and the changes are ſo frequent, ſo ſudden, and complete, the tranſitions ſo artfully conducted, that the ſame ideas are never continued or repeated to ſatiety.

Theſe gardens were begun when regularity was in faſhion; and the origininal boundary is ſtill preſerved, on account of its magnificence: for round the whole circuit, of between three or four miles, is carried a very broad gravel-walk, planted with rows of trees, and open either to the park or the country; a deep ſunk fence attends it all the way, and comprehends a ſpace of near 400 acres. But in the interior ſcenes of the garden, few traces of regularity appear; where it yet remains in the plantations, it is generally diſguiſed: every ſymptom, almoſt, of formality is obliterated from the ground; and an octagon baſin in the bottom is now converted into an irregular piece of water, which receives on one hand two beautiful ſtreams, and falls on the other down a caſcade into a lake.

In the front of the houſe is a conſiderable lawn, open to the water; beyond which are two elegant Doric pavilions, placed in the boundary of the garden, but not marking it, though they correſpond to each other; for ſtill further back, on the brow of ſome riſing grounds without the incloſure, ſtands a noble Corinthian arch, by which the principal approach is conducted, and from which all the gardens are ſeen, reclining back againſt their hills: they are rich with plantations; full of objects; and lying on both ſides of the houſe almoſt equally, every part is within a moderate diſtance, notwithſtanding the extent of the whole.

On the right of the lawn, but concealed from the houſe, is a perfect garden-ſcene, called the *queen's amphitheatre*, where art is avowed, though formality is avoided. The fore-ground is ſcooped into a gentle hollow. The plantations on the ſides, though but juſt reſcued from regularity, yet in ſtyle are contraſted to each other: they are, on one hand, chiefly thickets, ſtanding out from a wood; on the other, they are open groves, through which a glimpſe of the water is viſible. At the end of the hollow on a little knole, quite detached from all appendages, is placed an open Ionic rotunda: beyond it, a large lawn ſlopes acroſs the view; a pyramid ſtands on the brow; the queen's pillar, in a receſs on the deſcent; and all the three buildings, being evidently intended for ornament alone, are peculiarly adapted to a garden-ſcene. Yet their number does not render it gay: the duſky hue of the pyramid, the retired ſituation of the queen's pillar, and the ſolitary appearance of the rotunda, give it an air of gravity; it is encompaſſed with wood; and all the external views are excluded; even the opening into the lawn is but an opening into an incloſure.

At the king's pillar, very near to this, is another lovely ſpot; which is ſmall, but not confined; for no termination appears; the ground one way, the water another, retire under the trees out of ſight, but nowhere meet with a boundary. The view is firſt over ſome very broken ground, thinly and irregularly planted; then between two beautiful clumps, which feather down to the bottom; and afterwards acroſs a glade, and through a little grove beyond it, to that part of the lake where the thickets, cloſe upon the brink, ſpread a tranquillity over the ſurface, in which their ſhadows are reflected. Nothing is admitted to diſturb that quiet: no building obtrudes; for objects to fix the eye are needleſs in a ſcene which may be comprehended at a glance; and none would ſuit the paſtoral idea it inſpires, of elegance too refined for a cottage, and of ſimplicity too pure for any other edifice.

The ſituation of the rotunda promiſes a proſpect more enlarged; and in fact moſt of the objects on this ſide of the garden are there viſible: but they want both connection and contraſt; each belongs peculiarly to ſome other ſpot: they all are blended together in this, without meaning; and are rather ſhown on a map, than formed into a picture. The water only is capital; a broad expanſe of it is ſo near as to be ſeen under the little groupes on the banks without interruption. Beyond it is a wood, which in one place leaves the lake, to run up behind a beautiful building, of three pavilions joined by arcades, all of the Ionic order: it is called *Kent's Building*. And never was a deſign more happily conceived: it ſeems to be characteriſtically proper for a garden; it is ſo elegant, ſo varied, and ſo purely ornamental: it directly fronts the rotunda, and a narrow rim of the country appears above the trees beyond it. But the effect even of this noble object is fainter here than at other points: its poſition is not the moſt advantageous; and it is but one among many other buildings, none of which are principal.

The ſcene at the temple of Bacchus is in character directly the reverſe of that about the rotunda, though the ſpace and the objects are nearly the ſame in both: but in this, all the parts concur to form one whole. The ground from every ſide ſhelves gradually towards the lake; the plantations on the further bank open to ſhow Kent's building, riſe from the water's edge towards the knole on which it ſtands, and cloſe again behind it. That elegant ſtructure, inclined a little from a front view, becomes more beautiful by being thrown into perſpective; and though at a greater diſtance, is more important than before, becauſe it is alone in the view: for the queen's pillar and the rotunda are removed far aſide; and every other circumſtance refers to this intereſting object: the water attracts, the ground and the plantations direct, the eye thither: and the country does but juſt glimmer in the offſcape, but is cloſe and eminent above the wood, and connected by clumps with the garden. The ſcene all together is a moſt animated landſcape: and the ſplendor of the building; the reflection in the lake; the tranſparency of the water, and pictureſque beauty of its form, diverſified by little groupes on the brink, while on the broadeſt expanſe no more trees caſt their ſhadows than are ſufficient to vary the tints of the ſurface; all theſe circumſtances, vying in luſtre with each other, and uniting in the point to which every part of the ſcene is related, diffuſe a peculiar brilliancy over the whole compoſition.

The view from Kent's building is very different from thoſe which have been hitherto deſcribed. They are all directed down the declivity of the lawn. This riſes up the aſcent: the eminence being crowned with lofty wood, becomes thereby more conſiderable; and the hillocks into which the general fall is broken, ſloping further out this way than any other, they alſo acquire an importance which they had not before; that, particularly, on which the rotunda is placed, ſeems here to be a profound ſituation; and the ſtructure appears to be properly adapted to ſo open an expoſure. The temple of Bacchus, on the contrary, which commands ſuch an illuſtrious view, is itſelf a retired object, cloſe under the covert. The wood riſing on the brow, and deſcending down one ſide of the hill, is ſhown to be deep; is high, and ſeems to be higher than it is. The lawn too is extenſive; and part of the boundary being concealed, it ſuggeſts the idea of a ſtill greater extent. A ſmall portion only of the lake indeed is viſible; but it is not here an object: it is a part of the ſpot; and neither termination being in ſight, it has no dimintive appearance: if more water had been admitted, it might have hurt the character of the place, which is ſober and temperate; neither ſolemn nor gay; great and ſimple, but elegant; above ruſticity, yet free from oſtentation.

Theſe are the principal ſcenes on one ſide of the gardens. On the other, cloſe to the lawn before the houſe, is the winding valley abovementioned: the lower part of it is aſſigned to the Elyſian fields. Theſe are watered by a lovely rivulet; are very lightſome, and very airy, ſo thinly are the trees ſcattered about them; are open at one end to more water and a larger glade; and the reſt of the boundary is frequently broken to let in objects afar off, which appear ſtill more diſtant from the manner of ſhowing them. The entrance is under a Doric arch, which coincides with an opening among the trees, and forms a kind of viſta, through which a Pembroke bridge juſt below, and a lodge built like a caſtle in the park, are ſeen in a beautiful perſpective. That bridge is at one extremity of the gardens; the queen's pillar is at another; yet both are viſible from the ſame ſtation in the Elyſian fields: and all theſe external objects are unaffectedly introduced, diveſted of their own appurtenances, and combined with others which belong to the ſpot. The temple of Friendſhip alſo is in ſight, juſt without the place; and within it, are the temples of ancient Virtue, and of the Britiſh worthies; the one in an elevated ſituation, the other low down in the valley, and near to the water: both are decorated with the effigies of thoſe who have been moſt diſtinguiſhed for military, civil, or literary merit; and near to the former ſtands a roſtral column, ſacred to the memory of Captain Grenville, who fell in an action at ſea: by placing here the meed of valour, and by filling theſe fields with the repreſentations of thoſe who have deſerved

Principal Reſidence.

beſt of mankind, the character intended to be given to the ſpot is juſtly and poetically expreſſed; and the number of the images which are preſented or excited, perfectly correſponds with it. Solitude was never reckoned among the charms of Elyſium; it has been always pictured as the manſion of delight and of joy: and in this imitation, every circumſtance accords with that eſtabliſhed idea. The vivacity of the ſtream which flows through the vale; the glimpſes of another approaching to join it; the ſprightly verdure of the green ſward, and every buſt of the Britiſh worthies reflected in the water; the variety of the trees; the lightneſs of the greens; their diſpoſition; all of them diſtinct objects, and diſperſed over gentle inequalities of the ground; together with the multiplicity of objects both within and without, which embelliſh and enliven the ſcene; give it a gaiety, which the imagination can hardly conceive, or the heart wiſh to be exceeded.

Cloſe by this ſpot, and a perfect contraſt to it, is the alder grove; a deep receſs in the midſt of a ſhade, which the blaze of noon cannot brighten. The water ſeems to be a ſtagnated pool, eating into its banks; and of a peculiar colour, not dirty but clouded, and dimly reflecting the dun hue of the horſe-cheſnuts and alders which preſs upon the brink; the ſtems of the latter, riſing in cluſters from the ſame root, bear one another down, and ſlant over the water. Miſhapen elms and ragged firs are frequent in the wood which encompaſſes the hollow; the trunks of dead trees are left ſtanding amongſt them; and the uncouth ſumach, and the yew, with elder, nut, and holly, compoſe the underwood: ſome limes and laurels are intermixed; but they are not many: the wood is in general of the darkeſt greens; and the foilage is thickened with ivy, which not only twines up the trees, but creeps alſo over the falls of the ground: theſe are ſteep and abrupt: the gravel-walk is covered with moſs; and a grotto at the end, faced with broken flints and pebbles, preſerves, in the ſimplicity of its materials, and the duſkineſs of its colour, all the character of its ſituation: two little rotundas near it were better away; one building is ſufficient for ſuch a ſcene of ſolitude as this, in which more circumſtances of gloom concur than were ever perhaps collected together.

Immediately above the alder-grove is the principal eminence in the gardens. It is divided by a great dip into two pinnacles; upon one of which is a large Gothic building. The ſpace before this ſtructure is an extenſive lawn: the ground on one ſide falls immediately into the dip; and the trees which border the lawn, ſinking with the ground, the houſe riſes above them, and fills the interval: the vaſt pile ſeems to be ſtill larger than it is; for it is thrown into perſpective, and between and above the heads of the trees, the upper ſtory, the porticoes, the turrets and balluſtrades, and all the ſlated roofs, appear in a noble confuſion. On the other ſide of the Gothic building, the ground ſlopes down a long continued declivity into a bottom, which ſeems to be perfectly irriguous. Divers ſtreams wander about it in ſeveral directions: the conflux of that which runs from the Elyſian fields with another below it, is full in ſight; and a plain wooden bridge thrown over the latter, and evidently deſigned for a paſſage, impoſes an air of reality on the river. Beyond it is one of the Doric porticoes which front the houſe; but now it is alone; it ſtands on a little bank above the water, and is ſeen under ſome trees at a diſtance before it: thus grouped, and thus accompanied, it is a happy incident, concurring with many other circumſtances to diſtinguiſh this landſcape by a character of cheerfulneſs and amenity.

Principal Reſidence.

From the Gothic building a broad walk leads to the Grecian valley, which is a ſcene of more grandeur than any in the gardens. It enters them from the park, ſpreading at firſt to a conſiderable breadth; then winds; grows narrower, but deeper; and loſes itſelf at laſt in a thicket, behind ſome lofty elms, which interrupt the ſight of the termination. Lovely woods and groves hang all the way on the declivities: and the open ſpace is broken by detached trees; which, near the park, are cautiouſly and ſparingly introduced, leſt the breadth ſhould be contracted by them; but as the valley ſinks, they advance more boldly down the ſides, ſtretch acroſs or along the bottom, and cluſter at times into groupes and forms, which multiply the varieties of the larger plantations. Thoſe are ſometimes cloſe coverts, and ſometimes open groves: the trees riſe in one upon high ſtems, and feather down to the bottom in another; and between them are ſhort openings into the park or the gardens. In the midſt of the ſcene, juſt at the bend of the valley, and commanding it on both ſides, upon a large, eaſy, natural riſe, is placed the temple of Concord and Victory: at one place its majeſtic front of ſix Ionic columns, ſupporting a pediment filled with bas relief, and the points of it crowned with ſtatues, faces the view; at another, the beautiful colonnade, on the ſide, of ten lofty pillars, retires in perſpective. It is ſeen from every part; and impreſſing its own character of dignity on all around, it ſpreads an awe over the whole: but no gloom, no melancholy, attends it: the ſenſations it excites are rather placid; but full of reſpect, admiration, and ſolemnity: no water appears to enliven, no diſtant proſpect to enrich the view; the parts of the ſcene are large, the idea of it ſublime, and the execution happy; it is independent of all adventitious circumſtances, and relies on itſelf for its greatneſs.

The ſcenes which have been deſcribed are ſuch as are moſt remarkable for beauty or character; but the gardens contain many more; and even the objects in theſe, by their ſeveral combinations, produce very different effects, within the diſtance ſometimes of a few paces, from the unevenneſs of the ground, the variety of the plantations, and the number of the buildings. The multiplicity of the laſt has indeed been often urged as an objection to Stowe; and certainly, when all are ſeen by a ſtranger in two or three hours, twenty or thirty capital ſtructures, mixed with others of inferior note, do ſeem too many. But the growth of the wood every day weakens the objection, by concealing them one from the other: each belongs to a diſtinct ſcene; and if they are conſidered ſeparately, at different times, and at leiſure, it may be difficult to determine which to take away. Yet ſtill it muſt be acknowledged that their frequency deſtroys all ideas of ſilence and retirement. Magnificence and ſplendor are the characteriſtics of Stowe: it is like one of thoſe places celebrated in antiquity, which were devoted to the purpoſes of religion, and filled with ſacred groves, hallowed fountains,

Principal Reſidence.

tains, and temples dedicated to ſeveral deities; the reſort of diſtant nations, and the object of veneration to half the heathen world; this pomp is, at Stowe, blended with beauty; and the place is equally diſtinguiſhed by its amenity and its grandeur.

In the midſt of ſo much embelliſhment as may be introduced into this ſpecies of garden, a plain field, or a ſheep-walk, is ſometimes an agreeable relief, and even wilder ſcenes may occaſionally be admitted. Theſe indeed are not properly parts of a garden, but they may be comprehended within the verge of it; and the proximity to the more ornamented ſcenes is at leaſt a convenience, that the tranſition from the one to the other may be eaſy, and the change always in our option. For though a ſpot in the higheſt ſtate of improvement be a neceſſary appendage to a ſeat; yet, in a place which is perfect, other characters will not be wanting, if they cannot be had on a large ſcale, they are acceptable on a ſmaller; and ſo many circumſtances are common to all, that they may often be intermixed; they may always border on each other."

Pract Treat on Planting and gardening, p. 615.

But on this head it would be in vain to attempt to lay down particular rules: different places are marked by ſets of features as different from each other as are thoſe in mens faces. Much muſt be left to the ſkill and taſte of the artiſt; and let thoſe be what they may, nothing but mature ſtudy of the natural abilities of the particular place to be improved can render him equal to the execution, ſo as to make the moſt of the materials that are placed before him.

Some few general rules may nevertheleſs be laid down. The approach ought to be conducted in ſuch a manner, that the ſtriking features of the place ſhall burſt upon the view at once; no trick however ſhould be made uſe of; all ſhould appear to fall in naturally. In leading towards the houſe, its direction ſhould not be fallen in front, nor exactly at an angle, but ſhould paſs obliquely upon the houſe and its accompaniments; ſo that their poſition with reſpect to each other, as well as the perſpective appearance of the houſe itſelf, may vary at every ſtep: and having ſhown the front and the principal wing, or other accompaniment, to advantage, the approach ſhould wind to the back-front, which as has been already obſerved, ought to lie open to the park or paſtured grounds.

The improvements and the room from which they are to be ſeen ſhould be in uniſon. Thus the view from the drawing-room ſhould be highly embelliſhed, to correſpond with the beauty and elegance within: every thing here ſhould be feminine, elegant, beautiful, ſuch as attunes the mind to politeneſs and lively converſation. The breakfaſting room ſhould have more maſculine objects in view: wood, water, and an extended country for the eye to roam over; ſuch as allures us imperceptibly to the ride or the chace. The eating and banqueting rooms need no exterior allurements.

There is a harmony in taſte as in muſic: variety, and even wildneſs upon ſome occaſions, may be admitted, but diſcord cannot be allowed. If, therefore, a place ſo circumſtanced as to conſiſt of properties totally irreconcileable, the parts ought, if poſſible, to be ſeparated in ſuch a manner, that, like the air and the recitative, the adagio and the allegro, in muſic, they may ſet off each other's charms by the contraſt.—Theſe obſervations, in the elegant performance whence they are extracted, the author illuſtrates by the following deſcription and propoſed improvement of Perſefield, the ſeat of Mr Morris, near Chepſtow in Monmouthſhire; a place upon which nature has been peculiarly laviſh of her favours, and which has been ſpoken of by Mr Wheatley, Mr Gilpin, and other writers, in the moſt flattering terms.

Deſcription of Perſefield, *ibid.* p. 616, &c

"Perſefield is ſituated upon the banks of the river Wye, which divides Glouceſterſhire and Monmouthſhire, and which was formerly the boundary between England and Wales. The general tendency of the river is from north to ſouth; but about Perſefield it deſcribes by its winding courſe the letter S, ſomewhat compreſſed ſo as to reduce it in length and increaſe its width. The grounds, of Perſefield are lifted high above the bed of the river, ſhelving, and form the brink of a lofty and ſteep precipice, towards the ſouth-weſt.

"The lower limb of the letter is filled with Perſe-wood, which makes a part of Perſefield; but is at preſent an impenetrable thicket of coppice-wood. This dips to the ſouth-eaſt down to the water's edge; and, ſeen from the top of the the oppoſite rock, has a good effect.

"The upper limb receives the farms of Llancot: rich and highly cultivated; broken into incloſures, and ſcattered with groupes and ſingle trees: two well looking farm-houſes in the centre, and a neat white chapel on one ſide: altogether a lovely little paradiſaical ſpot. The lowlineſs of its ſituation ſtamps it with an air of meekneſs and humility; and the natural barriers which ſurround it adds that of peacefulneſs and ſecurity. Theſe pictureſque farms do not form a low flat bottom, ſubject to be overflowed by the river; but take the form of a gorget, riſing fulleſt in the middle and falling on every ſide gently to the brink of the Wye; except on the eaſt-ſide, where the top of the gorget leans in an eaſy manner againſt a range of perpendicular rock; as if to ſhow its diſk with advantage to the walks of Perſefield.

"This rock ſtretches acroſs what may be called the *Iſthmus*: leaving only a narrow paſs down into the fields of Llancot, and joins the principle range of rocks at the lower bend of the river.

"To the north, at the head of the letter, ſtands an immenſe rock (or rather a pile of immenſe rocks heaped one above another) called *Windcliff*; the top of which is elevated as much above the grounds of Perſefield as thoſe are above the fields of Llancot.

"Theſe ſeveral rocks, with the wooded precipices on the ſide of Perſefield, form a circular incloſure about a mile in diameter, including Perſe-wood, Llancot, the Wye, and a ſmall meadow lying at the foot of Windcliff.

"The grounds are divided into the upper and lower lawn, by the approach to the houſe: a ſmall irregular building, ſtanding near the brink of the precipice, but facing down the lower lawn, a beautiful ground, falling 'precipately every way into a valley which ſhelves down in the middle,' and is ſcattered with groupes and ſingle trees in an excellent ſtyle.

"The view from the houſe is ſoft, rich, and beautifully pictureſque; the lawn and woods of Perſefield and the oppoſite banks of the river; the Wye, near its mouth winding through 'meadows green as eme-

Principal Reſidence.

rald,' in a manner peculiarly graceful; the Severn, here very broad, backed by the wooded and highly cultivated hills of Glouceſterſhire, Wiltſhire, and Somertſhire. Not one rock enters into the compoſition. The whole view conſiſts of an elegant arrangement of lawn, wood, and water.

“ The upper lawn is a leſs beautiful ground, and the view from it, though it command the ‘ cultivated hills and rich valleys of Monmouthſhire,’ bounded by the Severn and backed by the Mendip-hills, is much inferior to that from the houſe.

“ To give variety to the views from Perſefield, to diſcloſe the native grandeur which ſurrounds it, and to ſet off its more ſtriking features to advantage, walks have been cut through the woods and on the face of the precipice which border the grounds to the ſouth and eaſt. The viewer enters theſe walks at the lower corner of the lower lawn.

“ The firſt point of view is marked by an alcove, from which are ſeen the bridge and the town of Chepſtow, with its caſtle ſituated in a remarkable manner on the very brink of a perpendicular rock, waſhed by the Wye; and beyond theſe the Severn ſhows a ſmall portion of its ſilvery ſurface.

“ Proceeding a little farther along the walk, a view is caught which the painter might call a complete landſcape: The caſtle with the ſerpentine part of the Wye below Chepſtow, intermixed in a peculiar manner with the broad waters of the Severn, form the fore-ground; which is backed by diſtant hills; the rocks, crowned with wood, lying between the alcove and the caſtle, to the right; and Caſtlehill farm, elevated upon the oppoſite banks of the river, to the left, form the two ſide-ſcreens. This point is not marked, and muſt frequently be loſt to the ſtranger.

“ The grotto, ſituated at the head of Perſe-wood, commands a near view of the oppoſite rocks; magnificent beyond deſcription! The littleneſs of human art was never placed in a more humiliating point of view; the Caſtle of Chepſtow, a noble fortreſs, is, compared with theſe natural bulwarks, a mere houſe of cards.

“ Above the grotto, upon the iſthmus of the Perſefield ſide, is a ſhrubbery; ſtrangely miſplaced! an unpardonable intruſion upon the native grandeur of this ſcene. Mr Gilpin's obſervations upon this, as upon every other occaſion, are very juſt. He ſays, ‘ It is a pity the ingenious embelliſher of theſe ſcenes could not have been ſatisfied with the great beauties of nature which he commanded. The ſhrubberies he has introduced in this part of his improvements I fear will rather be eſteemed paltry.’——‘ It is not the ſhrub which offends; it is the formal introduction of it. Wild underwood may be an appendage of the grandeſt ſcene; it is a beautiful appendage. A bed of violets or of lilies may enamel the ground with propriety at the foot of an oak; but if you introduce them artificially in a border, you introduce a trifling formality, and diſgrace the noble object you wiſh to adorn.’

“ The walk now leaves the wood, and opens upon the lower lawn, until coming near the houſe it enters the alarming precipice facing Llancot; winding along the face of it in a manner which does great honour to the artiſt. Sometimes the fragments of rock which fall in its way are avoided, at other times partially removed, ſo as to conduct the path along a ledge carved out of the rock; and in one inſtance, a huge fragment, of a ſomewhat conical ſhape and many yards high, is perforated; the path leading through its baſe. This is a thought which will hand down to future times the greatneſs of Mr Morris's taſte; the deſign and the execution are equally great; not a mark of a tool to be ſeen; all appears perfectly natural. The arch-way is made winding, ſo that on the approach it appears to be the mouth of a cave; and, on a nearer view, the idea is ſtrengthened by an allowable deception; a black dark hole on the ſide next the cliff, which, ſeen from the entrance before the perforation is diſcovered, appears to be the darkſome inlet into the body of the cave.

“ From this point, that vaſt incloſure of rocks and precipices which marks the peculiar magnificence of Perſefield is ſeen to advantage. The area, containing in this point of view the fields of Llancot and the lower margin of Perſe-wood, is broken in a manner peculiarly pictureſque by the graceful winding of the Wye; here waſhing a low graſſy ſhore, and there ſweeping at the feet of the rocks, which riſe in ſome places perpendicular from the water; but in general they have a wooded offſet at the baſe; above which they riſe to one, two, or perhaps three or four hundred feet high; expoſing one full face, ſilvered by age, and bearded with ivy, growing out of the wrinkle-like ſeams and fiſſures. If one might be allowed to compare the paltry performances of art with the magnificent works of nature, we ſhould ſay, that this incloſure reſembles a prodigious fortreſs which has lain long in ruins. It is in reality one of nature's ſtrong holds; and as ſuch has probably been frequently made uſe of. Acroſs the iſthmus on the Glouceſterſhire ſide there are the remains of a deep intrenchment, called to this day the *Bulwark*; and tradition ſtill teems with the extraordinary warlike feats that have been performed among this romantic ſcenery.

“ From the perforated rock, the walk leads down to the cold-bath (a complete place), ſeated about the mid-way of the precipice, in this part leſs ſteep; and from the cold-bath a rough path winds down to the meadow, by the ſide of the Wye, from whence the precipice on the Perſefield ſide is ſeen with every advantage; the giant fragments, hung with ſhrubs and ivy, riſe in a gaſtly manner from amongſt the underwood, and ſhow themſelves in all their native ſavageneſs.

“ From the cold-bath upward, a coach-road (very ſteep and difficult) leads to the top of the cliff, at the upper corner of the upper lawn. Near the top of the road is a point which commands one of the moſt pleaſing views of Perſefield: The Wye ſweeping through a graſſy vale which opens to the left:—Llancot backed by its rocks, with the Severn immediately behind them; and, ſeen in this point of view, ſeems to be divided from the Wye by only a ſharp ridge of rock, with a precipice on either ſide; and behind the Severn, the vale and wooded hills of Glouceſterſhire.

“ From this place a road leads to the top of Windcliff—aſtoniſhing ſight! The face of nature probably affords not a more magnificent ſcene! Llancot in all its grandeur, the grounds of Perſefield, the caſtle and town of Chepſtow, the graceful windings of the Wye below, and its conflux with the Severn; to the left the foreſt of Dean; to the right, the rich marſhes and pictureſque mountains of South Wales ; a broad view of the Severn, opening its ſea-like mouth ; the conflux of the Avon, with merchant ſhips at anchor in King-road, and veſſels of different deſcriptions under ſail ; Auſt-Cliff, and the whole vale of Berkely, backed by the wooded ſwells of Glouceſterſhire, the view terminating in clouds of diſtant hills, riſing one behind another, until the eye becomes unable to diſtinguiſh the earth's billowy ſurface from the clouds themſelves."

The leading principle of the improvement propoſed by our author is, to "ſeparate the ſublime from the beautiful ; ſo that in viewing the one, the eye might not ſo much as ſuſpect that the other was near.

" Let the hanging walk be conducted entirely along the precipices, or through the thickets, ſo as to diſcloſe the natural ſcenery, without once diſcovering the lawn or any other acquired ſoftneſs. Let the path be as rude as if trodden only by wild beaſts and ſavages, and the reſting places, if any, as ruſtic as poſſible.

" Eraſe entirely the preſent ſhrubbery, and lay out another as elegant as nature and art could render it before the houſe, ſwelling it out into the lawn towards the ſtables ; between which and the kitchen-garden make a narrow winding entrance.

" Convert the upper lawn into a deer-paddock, ſuffering it to run as wild, rough, and foreſt-like as total negligence would render it.

" The viewer would then be thus conducted : He would enter the hanging-walk by a ſequeſtered path at the lower corner of the lawn, purſuing it through the wood to beneath the grotto, and round the head-land, or winding through Perſewood, to the perforated rock and the cold-bath, without once conceiving an idea (if poſſible) that art, or at leaſt that much art, had been made uſe of in diſcloſing the natural grandeur of the ſurrounding objects ; which ought to appear as if they preſented themſelves to his view, or at moſt as if nothing was wanted but his own penetration and judgement to find them out. The walk ſhould therefore be conducted in ſuch a manner, that the breaks might be quite natural ; yet the points of view obvious, or requiring nothing but a block or a ſtone to mark them. A ſtranger at leaſt wants no ſeat here ; he is too eager, in the early part of his walk, to think of lounging upon a bench.

" From the cold-bath he would aſcend the ſteep, near the top of which a commodious bench or benches might be placed : the fatigue of aſcending the hill would require a reſting-place ; and there are few points which afford a more pleaſing view than this ; it is grand, without being too broad and glaring.

" From theſe benches he would enter the foreſt part. Here the idea of Nature in her primitive ſtate would be ſtrengthened : the roughneſſes and deer to the right, and the rocks in all their native wildneſs to the left. Even Llancot might be ſhut out from the view by the natural ſhrubbery of the cliff. The Lover's Leap, however (a tremendous peep), might remain ; but no benches, nor other work of art, ſhould here be ſeen. A natural path, deviating near the brink of the precipice, would bring the viewer down to the lower corner of the park ; where benches ſhould be placed in a happy point, ſo as to give a full view of the rocks and native wildneſſes, and at the ſame time hide the farm-houſes, fields, and other acquired beauties of Llancot.

" Having ſatiated himſelf with this ſavage ſcene, he would be led, by a ſtill ruſtic path, through the labyrinth—when the ſhrubbery, the lawn, with all its appendages, the graceful Wye, and the broad ſilver Severn, would break upon the eye with every advantage of ornamental nature : the tranſition could not fail to ſtrike.

" From this ſoft ſcene he would be ſhown to the top of Windcliff, where in one vaſt view he would unite the ſublime and beautiful of Perſefield."

Only one other particular remains to be noticed before cloſing this article. A place which is the reſidence of a family all the year is very defective, if ſome portion of it be not ſet apart for the enjoyment of a fine day, for air, and exerciſe, in winter. To ſuch a ſpot ſhelter is abſolutely eſſential ; and evergreens being the thickeſt covert, are therefore the beſt : their verdure alſo is then agreeable to the eye ; and they may be arranged ſo as to produce a beautiful mixture of greens, with more certainty than deciduous trees, and with almoſt equal variety : they may be collected into a wood ; and through that wood gravel-walks may be led along openings of a conſiderable breadth, free from large trees which would intercept the rays of the ſun, and winding in ſuch a manner as to avoid any draft of wind, from whatever quarter it may blow. But when a retreat at all times is thus ſecured, other ſpots may be adapted only to occaſional purpoſes ; and be ſheltered towards the north or the eaſt on one hand, while they are open to the ſun on the other. The few hours of cheerfulneſs and warmth which its beams afford are ſo valuable as to juſtify the ſacrifice even of the principles of beauty to the enjoyment of them ; and therefore no objections of ſameneſs or formality can prevail againſt the pleaſantneſs of a ſtraight walk, under a thick hedge or a ſouth wall. The eye may, however, be diverted from the ſkreen by a border before it, where the aconite and the ſnowdrop, the crocus and hepatica, brought forward by the warmth of the ſituation, will be welcome harbingers of ſpring ; and on the oppoſite ſide of the walk, little tufts of lauruſtines, and of variegated evergreens, may be planted. The ſpot thus enlivened by a variety of colours, and even a degree of bloom, may be ſtill further improved by a green-houſe. The entertainment which exotics afford peculiarly belongs to this part of the year ; and if amongſt them be interſperſed ſome of our earlieſt flowers, they will there blow before their time, and anticipate the gaiety of the ſeaſon which is advancing. The walk may alſo lead to the ſtoves, where the climate and the plants are always the ſame. And the kitchen-garden ſhould not be far off ; for that is never quite deſtitute of produce, and always an active ſcene : the appearance of buſineſs is alone engaging ; and the occupations there are an earneſt of the happier ſeaſons to which they are preparative. By theſe expedients even the winter may be rendered cheerful in a place where ſhelter is provided againſt all but the bittereſt inclemencies of the ſky, and agreeable objects and intereſting amuſements are contrived for every hour of tolerable weather.

For the particular operations in gardening, ſee PLANTING, PRUNING, GRAFTING, INOCULATING, *KITCHEN-Garden*, ORCHARD, *GREEN-Houſe*, *HOT-Houſe*, INARCHING, ESPALIER, &c. and the culture and management of different plants under their reſpective names.

GARDINER (Stephen), biſhop of of Wincheſter, and lord chancellor of England, born at Bury St Edmunds in Suffolk, natural ſon to Richard Woodville, brother to queen Elizabeth wife to Edward IV. was learned in the canon and civil laws, and in divinity. He ſigned the divorce of Henry VIII. from Katharine of Spain; abjured the pope's ſupremacy: and writ *De vera et falſa obedientia*, in behalf of the king; yet in Edward's reign he oppoſed the reformation, and was puniſhed with impriſonment; but queen Mary coming to the throne, ſhe enlarged him. He drew up the articles of marriage between the queen and Philip of Spain, which were very advantageous to England. He was violent againſt the reformers; but on his death-bed was diſſatisfied with his life, and often repeated theſe words: *Erravi cum Petro, ſed non flevi cum Petro.* He died in 1555.

GARGARISM (from γαργαριζω, "to waſh the mouth;") a gargle. Its uſe is for waſhing the mouth and throat with, when inflammations, ulcerations, &c. are there. A ſmall quantity may be taken into the mouth, and moved briſkly about, and then ſpit out; or if the patient cannot do this to any advantage, the liquor may be injected by a ſyringe. When gargles are required, their uſe ſhould be more frequently repeated than is done in common practice.

GARGET, a diſeaſe of cattle, conſiſting in a ſwelling of the throat and the neighbouring parts: to prevent which bleeding in the ſpring is recommended.

GARGIL, a diſtemper in geeſe, which by ſtopping the head frequently proves mortal. Three or four cloves of garlic, beaten in a mortar with ſome ſweet butter, and made into little balls, and given the creature faſting, are the ordinary cure.

GARIDELLA, in botany: A genus of the trigynia order, belonging to the decandria claſs of plants; and in the natural method ranking under the 26th order, *Multiſiliquæ*. The calyx is pentaphyllous, with leaves reſembling flower-petals; there are five bilabiate and bifid nectaria; the capſules are polyſpermous, and adhering together.

GARIZIM, Gerizim, or *Geriſim*, (anc. geog.) a mountain of Samaria, at the foot of which ſtood Sichem; ſo near, that Jotham could be heard by the Sichemites from its top. (Judges ix. 7.) Famous for the temple built on it by Sanballet, in favour of his ſon-in-law Manaſſeth, by the permiſſion of Alexander the Great, and 200 years after deſtroyed by John Hyrcanus, ſon of Simon, the fourth in ſucceſſion of the Aſmoneans (Joſephus).

GARLAND, a ſort of chaplet made of flowers, feathers, and ſometimes precious ſtones, worn on the head in manner of a crown.—The word is formed of the French *guirlande*, and that of the barbarous Latin *garlanda*, or Italian *ghirlande*. Menage traces its origin from *gyrus*, through *gyrulus*, to *gyrulare*, *gyrlandum*, *ghirlandum*; and at length *ghirlanda* and *guirlande*; ſo that *guirlande* and *garland* are deſcended the ſixth or ſeventh degree from *gyrus*.—Hicks rejects this derivation, and brings the word from *gardel handa*, which in the northern languages ſignify a *noſegay, artfully wrought with the hand*.

Garland alſo denotes ornaments of flowers, fruits, and leaves, intermixed; anciently much uſed at the gates of temples, where feaſts and ſolemn rejoicings were held; or at any other place where marks of public joy or gaity were required, as at triumphal arches, tournaments, &c.

GARLIC. See Alium.

GARMENT, that wherewith any perſon is clothed. See Dress and Habit.

GARNET, in natural hiſtory, a very beautiful gem, of a red colour, with an admixture of blue. See Granate.

When pure and free from blemiſhes, it is little inferior in appearance to the oriental ruby, though only of a middle degree of hardneſs between the ſapphire and common cryſtal. It is found of various ſizes, from that of a pin's head to an inch in diameter.

Among our lapidaries and jewellers, genuine garnets are known by different names according to their different degrees of colour. 1. The garnet, ſimply ſo called, is the fineſt and moſt valuable kind, being of a very deep blood-red, with a faint admixture of blue. 2. The rock-ruby; a name very improperly given to the garnet when it is of a very ſtrong but not deep red, and has a fairer caſt of the blue: this is a very beautiful gem. 3. The ſorane or ſerain garnet; that of a yet brighter red, approaching to the colour of native cinnabar, with a faint blue tinge. 4. The almandine, a garnet only a little paler than that called the *rock-ruby*.

Garnet-Colour. See *Colouring of Glass.*

To imitate Garnets. The making the counterfeit garnet in paſte is done as follows.—Take prepared cryſtal two ounces, common red-lead ſix ounces, mangaſe 16 grains, zaffre three grains; mix all well, put them into a crucible, cover it with lute, and ſet it in a potter's kiln for 24 hours. Or take cryſtal two ounces, minium five ounces and a half, manganeſe 15 grains, zaffre four grains: mix them well together; and let all be baked, in a pot well luted, in a potter's kiln 24 hours.

GARONNE, a large river of France, which taking its riſe in the Pyrenean mountains, runs north weſt by the city of Tholouſe, divides the provinces of Guienne and Gaſcony, and, viſiting the city of Bourdeaux, falls into the Bay of Biſcay, about 60 miles below that city. It has alſo a communication with the Mediterranean, by means of the royal canal of Louis XIV. The tide flows up this river 20 miles above Bourdeaux.

GARRICK (David), Eſq; the great Roſcius of Britain and this age, who for near 40 years hath ſhone the brighteſt luminary in the hemiſphere of the ſtage, was born at the Angel Inn at Hereford, in the year 1716. His father, Captain Peter Garrick, was a French refugee, and had a troop of horſe which were then quartered in that city. This rank he maintained in the army for ſeveral years, and had a majority at the time of his death; that event, however, prevented him from ever enjoying it. Mr Garrick received the firſt rudiments of his education at the free-ſchool at Lichfield; which he afterwards completed at Rocheſter, under the celebrated Mr Colſon, ſince mathematical profeſſor at Cambridge. Dr Johnſon and he were fellow-ſtudents at the ſame ſchool: and it is a curious fact, that theſe two celebrated geniuſes came up to London, with the intention of puſhing themſelves into active life, in the ſame coach. On the 9th of March 1736, he was entered at the honourable ſociety of Lincoln's-Inn. The ſtudy of the law, however, he ſoon quitted; and followed for ſome time the employment of a wine-merchant: but that too diſguſting him, he gave way at laſt to the irreſiſtible bias of his mind, and joined a travelling company of comedians at Ipſwich in Suffolk, where he went by the name of *Lyddle*. Having in this poor ſchool of Apollo got ſome acquaintance with the theatric art, he burſt at once upon the world, in the year 1740-1, in all the luſtre of perfection, at the little theatre in Goodman's Fields, then under the direction of Henry Giffard.

The character he firſt performed was Richard III. in which, like the ſun-burſting from behind a cloud, he diſplayed in the earlieſt dawn a ſomewhat more than meridian brightneſs. His excellence dazzled and aſtoniſhed every one; and the ſeeing a young man, in no more than his 24th year, and a novice in reality to the ſtage, reaching at one ſingle ſtep to that height of perfection which maturity of years and long practical experience had not been able to beſtow on the then capital performers of the Engliſh ſtage, was a phenomenon that could not but become the object of univerſal ſpeculation and of as univerſal admiration. The theatres at the weſt end of the town were deſerted; Goodman's Fields, from being the rendezvous of citizens and citizens wives alone, became the reſort of all ranks of men; and Mr Garrick continued to act till the cloſe of the ſeaſon.

Having very advantageous terms offered him for the performing in Dublin during ſome part of the ſummer (1741), he went over thither, where he found the ſame juſt homage paid to his merit which he had received from his own countrymen. To the ſervice of the latter, however, he eſteemed himſelf more immediately bound; and therefore, in the enſuing winter, engaged himſelf to Mr Fleetwood, then manager of Drury-Lane: in which theatre he continued till the year 1745, when he again went over to Ireland, and continued there the whole ſeaſon, joint manager with Mr Sheridan in the direction and profits of the theatre-royal in Smock-Alley. From thence he returned to England, and was engaged for the ſeaſon of 1746 with Mr Rich at Covent-Garden. This was his laſt performance as an hired actor: for in the cloſe of that ſeaſon, Mr Fleetwood's patent for the management of Drury-Lane being expired, and that gentleman having no inclination further to purſue a deſign by which, from his want of acquaintance with the proper conduct of it, or ſome other cauſe, he had conſiderably impaired his fortune; Mr Garrick, in conjunction with Mr Lacy, purchaſed the property of that theatre, together with the renovation of the patent; and in the winter of 1747, opened it with the greateſt part of Mr Fleetwood's company, and with the great additional ſtrength of Mr Barry, Mrs Prichard, and Mrs Cibber, from Covent-Garden.

Were we to trace Mr Garrick through the ſeveral occurrences of his life,—a life ſo active, ſo buſy, and ſo full of occurrence as his, we ſhould ſwell this account to many pages. Suffice it to ſay, he continued in the unmoleſted enjoyment of his fame and unrivalled excellence to the moment of his retirement. His univerſality of excellence was never once attacked by competition. Tragedy, comedy, and farce, the lover and the hero, the jealous huſband who ſuſpects his wife without cauſe, and the thoughtleſs lively rake who attacks it without deſign, were all alike his own. Rage and ridicule, doubt and deſpair, tranſport and tenderneſs, compaſſion and contempt: love, jealouſy, fear, fury, and ſimplicity; all took in turn poſſeſſion of his features, while each of them in turn appeared to be the ſole poſſeſſor of his heart. In the ſeveral characters of Lear and Hamlet, Richard, Dorilas, Romeo, and Luſignane; in his Ranger, Bayes, Drugger, Kitely, Brute, and Benedick, you ſaw the muſcular conformations that your ideas attached to them all. In ſhort, Nature, the miſtreſs from whom alone this great performer borrowed all his leſſons, being in herſelf inexhauſtible, this her darling ſon, marked out for her trueſt repreſentative, found an unlimited ſcope for change and diverſity in his manner of copying from her various productions. There is one part of theatrical conduct which ought unqueſtionably to be recorded to Mr Garrick's honour, ſince the cauſe of virtue and morality, and the formation of public manners, are conſiderably dependent upon it; and that is, the zeal with which he aimed to baniſh from the ſtage all thoſe plays which carry with them an immoral tendency, and to prune from thoſe which do not abſolutely, on the whole, promote the intereſts of vice, ſuch ſcenes of licentiouſneſs and liberty, as a redundancy of wit, and too great livelineſs of imagination have induced ſome of our comic writers to indulge themſelves in, and which the ſympathetic diſpoſition of our age of gallantry and intrigue has given ſanction to. The purity of the Engliſh ſtage has certainly been much more fully eſtabliſhed during the adminiſtration of this theatrical miniſter, than it had ever been during preceding managements. He ſeems to have carried his modeſt, moral, chaſte, and pious principles with him into the very management of the theatre itſelf, and reſcued performers from that obloquy which ſtuck on the profeſſion. Of thoſe who were accounted blackguards, unworthy the aſſociation of the world, he made gentlemen, united them with ſociety, and introduced them to all the domeſtic comforts of life. The theatre was no longer eſteemed the receptacle of all vice; and the moral, the ſerious, the religious part of mankind, did not heſitate to partake the rational entertainment of a play, and paſs a cheerful evening undiſguſted with the licentiouſneſs, and uncorrupted by the immorality, of the exhibition.

Notwithſtanding the numberleſs and laborious avocations attendant on his profeſſion as an actor, and his ſtation as a manager; yet ſtill his active genius was perpetually burſting forth in various little productions in the dramatic and poetical way, whoſe merit cannot but make us regret his want of time for the purſuance of more extenſive and important works. It is certain, that his merit as an author is not of the firſt magnitude: but his great knowledge of men and manners, of ſtage-effect, and his happy turn for lively and ſtriking ſatire, made him generally ſucceſsful: and his prologues and epilogues in particular, which are almoſt innumerable, poſſeſs ſuch a degree of happineſs, both in the conception and execution, as to ſtand unequalled. His Ode on the death of Mr Pelham run through four editions in leſs than ſix weeks. His Ode on Shakeſpeare is a maſterly piece of poetry; and when delivered by himſelf, was a moſt capital exhibition. His alterations of Shakeſpeare and other authors have been at times ſucceſsful, and at times exploded. The cutting out the grave-diggers ſcene from Hamlet will never be forgot to him by the inhabitants of the gallery at Drury. Though neceſſary to the chaſteneſs of the ſcene, they cannot bear to loſe ſo much true ſterling wit and humour; and it muſt be owed, that exuberances of that kind, though they hurt the uniformity, yet increaſe the luxuriance of the tree. Among his alterations the following are part: Every Man in his Humour, altered from Ben Johnſon; Romeo and Juliet, Winter's Tale, Catherine and Petruchio, Cymbeline, Hamlet, &c. altered and made up from Shakeſpeare: Gameſters, a comedy, from Shirley; Iſabella, from Southerne. To theſe we add, as original productions, the Farmer's Return, and Linco's Travels, interludes; Guardian, Lethe, Lying Valet, Miſs in her Teens, Male Coquet, Iriſh Widow, and other comedies in two acts; Enchanter, a muſical entertainment; Lilliput; the Chriſtmas Tale is aſcribed to him, and many others.

We now bring him to the period of his retirement in the ſpring of 1776; when, full of fame, with the acquirement of a ſplendid fortune, and growing into years, he thought proper to ſeek the vale of life, to enjoy that dignified and honourable eaſe which was compatible with his public ſituation, and which he had ſo well earned by the activity and the merits of his dramatic reign. But very ſhort indeed was the period allotted to him for this precious enjoyment: for on the 20th of January 1779, he departed this life; leaving no one rival in excellence upon earth to compenſate for his loſs, or a hope of our ever meeting with his like again.

GARRISON, in the art of war, a body of forces, diſpoſed in a fortreſs, to defend it againſt the enemy, or to keep the inhabitants in ſubjection; or even to be ſubſiſted during the winter ſeaſon: hence *garriſon* and *winter-quarters* are ſometimes uſed indifferently for the ſame thing; and ſometimes they denote different things. In the latter caſe, a garriſon is a place wherein forces are maintained to ſecure it, and where they keep regular guard, as a frontier town, a citadel, caſtle, tower, &c. The garriſon ſhould be always ſtronger than the townſmen.

Du Cange derives the word from the corrupt Latin *garniſio*, which the latter writers uſe to ſignify all manner of munition, arms, victuals, &c. neceſſary for the defence of a place, and ſuſtaining of a ſiege.

Winter-quarters ſignify a place where a number of forces are laid up in the winter ſeaſon, without keeping the regular guard.

GARSTANG, a town in Lancaſhire, 223 miles from London; in the poſt road between Preſton and Lancaſter. It is a large populous place, near a mile in length, but built in a very irregular manner, with dirty ſtreets, and very indifferent houſes. The church is a ſtately Gothic ſtructure. By the late inland navigation, it has communication with the rivers Merſey, Dee, Ribble, Ouſe, Trent, Darwent, Severn, Humber, Thames, Avon, &c. which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, York, Weſtmoreland, Cheſter, Stafford, Warwick, Leiceſter, Oxford, Worceſter, &c.

GARTER, a ligature for tying up the ſtocking; but particularly uſed for the badge of a noble order of knights, hence denominated the

Order of the GARTER, a military order of knighthood, the moſt noble and ancient of any lay-order in the world, inſtituted by Edward III. The knights-companions are generally princes and peers; and the king of England is the ſovereign or chief of the order. The number of knights was originally 26; but ſix were added in 1786, on account of the increaſe of the royal family. They are a college or corporation, having a great and little ſeal.

Their officers are a prelate, chancellor, regiſter, king at arms, and uſher of the black rod. They have alſo a dean, with 12 canons, and petty canons, vergers, and 26 penſioners or poor knights. The prelate is the head. This office is veſted in the biſhop of Wincheſter, and has ever been ſo. Next the prelate is the chancellor; which office is veſted in the biſhop of Saliſbury, who keeps the ſeals, &c. The next is the regiſter, who by his oath is to enter upon the regiſtry, the ſcrutinies, elections, penalties, and other acts of the order with all fidelity: The dean of Windſor is always regiſter *ex officio*. The fourth officer is Garter and king-at-arms, being two diſtinct offices united in one perſon. Garter carries the rod and ſceptre at the feaſt of St George, the protector of this order, when the ſovereign is preſent. He notifies the elections of new knights, attends the ſolemnity of their inſtallations, carries the garter to the foreign princes, &c. He is the principal officer within the college of arms, and chief of the heralds. See *KING-at-Arms*.

All theſe officers except the prelate hath fees and penſions. The college of the order is ſeated in the caſtle of Windſor, within the chapel of St George, and the charter-houſe, erected by the founder for that purpoſe. The habit and enſign of the order are, a garter, mantle, cape, george, and collar. The three firſt were aſſigned to the knights companions by the founder; and the george and collar by Henry VIII.

The garter challenges pre-eminence over all the other parts of the dreſs, by reaſon that from it the noble order is denominated; that it is the firſt part of the habit preſented to foreign princes and abſent knights, who, and all other knights-elect, are therewith firſt adorned; and it is of ſo great honour and grandeur, that by the bare inveſtiture with this noble enſign, the knights are eſteemed companions of the greateſt military order in the world. It is worn on the left leg between the knee and calf, and is enamelled with this motto, HONI SOIT QUI MAL Y PENSE; i.e. *Shame to him that thinks evil hereof*: The meaning of which is, that king Edward having laid claim to the kingdom of France, retorted ſhame and defiance upon him that ſhould dare to think amiſs of the juſt enterpriſe he had undertaken, for recovering his lawful right to that crown; and that the bravery of thoſe knights whom he had elected into this order, was ſuch as would enable him to maintain the quarrel againſt thoſe that thought ill of it.

The mantle is the chief of theſe veſtments made uſe of upon all ſolemn occaſions. The colour of the mantle is by the ſtatutes appointed to be blue. The length of the train of the mantle only diſtinguiſhes the ſovereign from the knights-companions. To the collar of the mantle is fixed a pair of long ſtrings, anciently wove with blue ſilk only, but now twiſted round, and made of Venice gold and ſilk, of the colour of the robe, with knobs or buttons, and taſſels at the end. The left ſhoulder of the mantle has from the inſtitution been adorned with a large garter, with the device, Honi soit, &c. Within this is the croſs of the order, which was ordained to be worn at all times by king Charles I. At length the ſtar was introduced, being a ſort of croſs irradiated with beams of ſilver.

The collar is appointed to be compoſed of pieces of gold in faſhion of garters, the ground enamelled blue, and the motto gold.

When the knights wear not their robes, they are to have a ſilver ſtar on the left ſide; and they commonly bear the picture of St George, enamelled on gold, and beſet with diamonds, at the end of a blue ribbon, croſſing the body from the left ſhoulder. They are not to appear abroad without the garter, on penalty of 6s. 8d. paid to the regiſter.

The manner of electing a knight-companion into this moſt noble order, and the ceremonies of inveſtiture, are as follow. When the ſovereign deſigns to elect a companion of the garter, the chancellor belonging to this order draws up the letters, which, paſſing both under the ſovereign's ſign-manual and ſignet of the order, are ſent to the perſon by Garter principal king at arms; and are in this manner or to the ſame effect: "We, with the companions of our moſt noble order of the garter, aſſembled in chapter, holden this preſent day at our caſtle at Windſor, conſidering the virtuous fidelity you have ſhown, and the honourable exploits you have done in our ſervice, by vindicating and maintaining our right, &c, have elected and choſen you one of the companions of our order. Therefore, we require you to make your ſpeedy repair unto us, to receive the enſigns thereof, and be ready for your inſtallation upon the — day of this preſent month, &c."

The garter, which is of blue velvet bordered with fine gold-wire, having commonly the letters of the motto of the ſame, is, at the time of election, buckled upon the left leg, by two of the ſenior companions, who receive it from the ſovereign, to whom it was preſented upon a velvet cuſhion, by Garter king at arms, with the uſual reverence, whilſt the chancellor reads the following admonition, enjoined by the ſtatutes: "To the honour of God omnipotent, and in memorial of the bleſſed martyr St George, tie about thy leg, for thy renown, this noble garter; wear it as the ſymbol of the moſt illuſtrious order, never to be forgotten or laid aſide; that thereby thou mayeſt be admoniſhed to be courageous; and having undertaken a juſt war, in which thou ſhalt be engaged, thou mayeſt ſtand firm, valiantly fight, and ſucceſſively conquer." The princely garter being then buckled on, and the word of its ſignification pronounced, the knight-elect is brought before the ſovereign, who puts about his neck, kneeling, a dark blue ribbon, whereunto is appendant, wrought in gold within the garter, the image of St George on horſeback, with his ſword drawn, encountering with the dragon. In the mean time, the chancellor reads the following admonition: "Wear this ribbon about thy neck, adorned with the image of the bleſſed martyr and ſoldier of Chriſt St George, by whoſe imitation provoked, thou mayeſt ſo overpaſs both proſperous and adverſe adventures, that having ſtoutly vanquiſhed thy enemies both of body and ſoul, thou mayeſt not only receive the praiſe of this tranſient combat, but be crowned with the palm of eternal victory." Then the knight elected kiſſes the ſovereign's hand; thanks his majeſty for the great honour done him; riſes up, and ſalutes all the companions ſeverally, who return their congratulations. See a repreſentation of the above inſignia, among others, on the plate belonging to *Orders of Knighthood*.

Since the inſtitution of this order, there have been eight emperors and twenty-eight kings, beſides numerous ſovereign princes, enrolled as companions thereof. Its origin is ſomewhat differently related. The common account is, that the counteſs of Saliſbury at a ball happening to drop her garter, the king took it up and preſented it to her with theſe words, "*Honi ſoit qui mal y penſe;*" i. e. Evil to him that evil thinks. This accident, it is ſaid, gave riſe to the order and the motto; it being the ſpirit of the times to mix love and war together: but as in the original ſtatutes of this order there is not the leaſt conjecture to countenance ſuch a feminine inſtitution, credit cannot be given to this tradition. Camden, Fern, &c. take it to have been inſtituted on occaſion of the victory obtained by Edward over the French at the battle of Creſſey: that prince, ſay ſome hiſtorians, ordered his garter to be diſplayed, as a ſignal of battle: in commemoration whereof, he made a garter the principal ornament of the order erected in memory of this ſignal victory, and a ſymbol of the indiſſoluble union of the knights.

It appears from Raſtel's chronicle, lib. vi. quoted by Granger in the ſupplement to his Biographical Hiſtory, that this order was deviſed by Richard I. at the ſiege of the city of Acres, when he cauſed twenty-ſix knights, who firmly ſtood by him, to wear thongs of blue leather about their legs, and that it was perfected in the nineteenth year of Edward III.

In 1551, Edward VI. made ſome alterations in the ritual of this order: that prince compoſed it in Latin, the original whereof is ſtill extant in his own hand-writing. He there ordained, that the order ſhould no longer be called the order of St George, but that of the garter; and, inſtead of the George, hung at the collar, he ſubſtituted a cavalier, bearing a book on the point of his ſword, with the word *protectio* graven on the ſword, and *verbum Dei* on the book; with a buckle in the left hand, and the word *fides* thereon. Larrey.

Garter, principal King at Arms. This office was inſtituted by Henry V.

Garter, and principal king at arms, are two diſtinct offices united in one perſon: Garter's employment is to attend the ſervice of the order of the garter; for which he is allowed a mantle and badge, a houſe in Windſor-Caſtle, and penſions both from the ſovereign and knights, and, laſtly, fees. He alſo carries the rod and ſceptre at every feaſt of St George, when the ſovereign is preſent, and notifies the election of ſuch as are new choſen; attends the ſolemnity of their inſtallations, and takes care of placing their arms over their ſeats; and carries the garter to foreign kings and princes, for which ſervice it has been uſual to join him in commiſſion with ſome peer, or other perſon of diſtinction.

Garter's oath relates only to ſervices being performed within the order, and is taken in chapter before the ſovereign and knights. His oath, as king at arms, is taken before the earl marſhal.

Garter is alſo a term in heraldry, ſignifying the moiety or half of a bend.

GARTH is uſed in ſome parts of England for a little backſide or cloſe. It is an ancient Britiſh word. Gardd, in that language, ſignifies *garden*, and is pronounced, and written *garth*. This word is alſo uſed for a dam or wear, &c.

Garth-men is uſed in the Engliſh ſtatutes for thoſe who catch fiſh by means of fiſh-garths, or wears. By ſtatute it is ordained that no fiſher, nor garth-man, ſhall uſe any nets or engines to deſtroy the fry of fiſh, &c. 17 Ric. II. cap. 9. The word is ſuppoſed by ſome to be derived from the Scotch word *gart*, which ſignifies *forced* or *compelled*; becauſe fiſh are forced by the wear into a loop, where they are taken.

Garth (Sir Samuel), an excellent Engliſh poet and phyſician, was deſcended from a good family in Yorkſhire. He was admitted into the college of phyſicians at London in 1693. He at that time zealouſly promoted and encouraged the erecting of the diſpenſary for the relief of the ſick poor, by giving them advice gratis, and medicines at low rates. This work of charity having expoſed him and many other phyſicians to the envy and reſentment of ſeveral perſons of the ſame faculty as well as apothecaries, he ridiculed them, with peculiar ſpirit and vivacity, in a poem called the *Diſpenſary*, in ſix cantos, highly eſteemed. He was one of the moſt eminent members of the famous ſociety called the *Kit-Kat Club*, which conſiſted of noblemen and gentlemen diſtinguiſhed by their excellent parts and affection to the houſe of Hanover. Upon the acceſſion of George I. he was knighted, and made phyſician in ordinary to his majeſty, and phyſician-general to the army. Nor were theſe more than juſt rewards even of his phyſical merit. He had gone through the office of cenſor of the college in 1702; and had practiſed always with great reputation, and a ſtrict regard to the honour and intereſt of the faculty, never ſtooping to proſtitute the dignity of his profeſſion, through mean and ſordid views of ſelf-intereſt, to any even the moſt popular and wealthy apothecaries. In a ſteady adherence to this noble principle, he concurred with the much celebrated Dr Radcliffe, with whom he was alſo often joined in phyſical conſultations. He had a very extenſive practice, but was very moderate in his views of advancing his own fortune; his humanity and good-nature inclining him more to make uſe of the great intereſt he had with perſons in power, for the ſupport and encouragement of other men of letters. He choſe to live with the great in that degree of independency and freedom which became a man poſſeſſed of a ſuperior genius, whereof he was daily giving freſh proofs to the public. One of his laſt performances in polite letters, was his tranſlation of the whole fourteenth book, and the ſtory of Cinnus in the fifteenth book, of Ovid's Metamorphoſes. Theſe, together with an Engliſh verſion of the reſt, were publiſhed in 1717; and he has prefixed an excellent preface to the whole wherein he not only gives an idea of the work, and points out its principal beauties, but ſhows the uſes of the poem, and how it may be read to moſt profit. The diſtemper which ſeized him the enſuing year, and ended not but with his life, cauſed a general concern; which was particularly teſtified by lord Lanſdown, a brother-poet, though of a different party, in ſome admirable verſes written on the occaſion. He died, after a ſhort illneſs, which he bore with great patience, in January 1719.

GARUMNA, a noble and navigable river of Gaul, which riſing from the Pyrenees, formerly bounded Aquitain on the north (Cæſar;) but by the new regulation of Auguſtus divided it in the middle, emptying itſelf, to the north of Burdegala, into the Aquitanic ocean. Now the *Garonne*. Mela obſerves concerning it, that unleſs it is ſwelled by winter rains, or the melting of the ſnow, it is for a great part of the year ſhoaly and ſcarce navigable: but when increaſed by the meeting tide, whereby its waters are repelled, it is ſomewhat fuller, and the farther the river advances, it is broader, till at length it reſembles a large frith or arm of the ſea; not only bearing large veſſels, but alſo ſwelling like a raging ſea, toſſes them extremely, eſpecially if the direction of the wind be one way and that of the current another.

GAS, a general name for all fluids of the aerial kind, excepting the common air we breathe. It is derived from the German *gaſcht* or *gaſt*, ſignifying an eruption of wind, or the ebullition attending the expulſion of elaſtic fluids from ſubſtances in a ſtate of fermentation or efferveſcence. It was originally given by Van Helmont to the vapour of charcoal, the ſame with the fluid now called *fixed air*, and ſome other factitious airs; and from him has been employed by modern philoſophers as a general term for all the fluids about which aerology is converſant.

Under the article Aerology, the nature and properties of theſe fluids are explained at large; here, however, for the more eaſy comprehenſion of the ſubject, we ſhall give a liſt of theſe fluids, with a general account of the moſt remarkable particulars hitherto diſcovered concerning them. The gaſes, or permanently elaſtic fluids, as yet known, are,

1. Common or atmoſpherical air.
2. Fixed air.
3. Inflammable air.
4. Nitrous air.
5. Dephlogiſticated air.
6. Vitriolic-acid air.
7. Marine-acid air.
8. Nitrous-acid air.
9. Fluor-acid air.
10. Vegetable-acid air.
11. Alkaline air.
12. Dephlogiſticated nitrous air.
13. Sulphurated inflammable air.
14. Hepatic air.
15. Phlogiſticated air.

The moſt remarkable properties of theſe are as follow.

1. *Atmoſpherical air* ſupports both animal and vegetable life; and ſurrounding the whole globe to a conſiderable height, is one of the great agents employed by nature for executing her moſt important purpoſes.

It is compoſed of one part of dephlogiſticated air, and three or more of phlogiſticated air.

2. *Fixed air* is produced in great plenty in all kinds of combuſtion. If the combuſtible body be ſet on fire in pure dephlogiſticated air, the fixed air is proportionably pure; but if in the common atmoſphere the produce is contaminated by the whole quantity of phlogiſticated air contained in that portion of the atmoſphere by which the combuſtion was ſupported, it proves fatal to animals in a very ſhort time, but is favourable to vegetation. It is abſorbed in conſiderable quantities by water, to which it communicates an agreeable acidulous taſte, and a power of diſſolving iron; and is the principal ingredient in mineral waters. It is taken up in great quantity by pure alkaline ſalts whether fixed or volatile; by calcined magneſia, lime, or calcareous earth; all of which it neutralizes, and forms with them ſalts of different kinds. Lime abſorbs it more readily either when quite dry or entirely diſſolved in water than when expoſed to it in a moiſt maſs, and lime-water is readily precipitated by it; but magneſia attracts it more readily when in a moiſt maſs; and the fixed alkalies equally well in either caſe, unleſs when violently heated.

Fixed air is contained in great quantity in fermented liquors, to which it gives their agreeable taſte and briſkneſs; and by impregnating them with it, they may be recovered from a vapid ſtate and rendered briſk and agreeable as before. It has a conſiderable antiſeptic power; and notwithſtanding its pernicious qualities when taken into the lungs, has been found ſerviceable in putrid diſeaſes when ſwallowed, or when injected by way of glyſter. Being a natural product of combuſtion, it is met with in great quantities in the neighbourhod of volcanoes, or mountains which have formerly been volcanoes, where it often produces miſchievous effects. It is alſo met with in mines, where it often proves fatal to the workmen. In the artificial way it is procured from fermenting liquors; from the calcination of magneſia and calcareous earths by heat; and from a mixture of theſe earths with acids, chiefly the vitriolic. When procured from large quantities of fermenting liquors, it lies in a large body on the ſurface of the liquor, generally nine inches or a foot thick, and affords an amuſing appearance on extinguiſhing lighted candles or chips of wood in it. In theſe experiments the ſmoke readily unites with the gas, ſo that little or none of it can diſperſe itſelf into the atmoſphere: and it is remarkable, that the upper ſurface of this ſmoke which floats in the fixed air is ſmooth and well defined, but the under part is ragged, and ſometimes even collecting itſelf into balls connected with the upper ſurface by ſlender threads. Sometimes the ſmoke will form itſelf into broad flakes parallel to the ſurface of the liquor, and at different diſtances from it, exactly like clouds; and theſe appearances will continue for upwards of an hour with very little variation. Dr Prieſtley tried the ſmoke of gun-powder, roſin, ſulphur, and other electric ſubſtances; and found them all retained equally by the fixed air, as well as the ſmoke of vitriolic acid raiſed by putting a burning coal in it.

Fixed air does not very readily unite with common air. It is near twice as heavy as atmoſpheric air, and acquires a proportionably greater elaſticity by heat. It is compoſed of dephlogiſticated air and phlogiſton; which two ingredients are partly ſeparated by the electric ſpark. It may be kept for any length of time in veſſels inverted into quickſilver, or even into water, with a coat of oil about half an inch thick on its ſurface.

3. *Inflammable air* is compoſed of phlogiſton and water rarefied by heat. It is the lighteſt fluid known in nature, being 10 or 12 times ſpecifically lighter than the common atmoſphere. It is pernicious to animals, but ſupports vegetable life. By itſelf it extinguiſhes flame; but when mixed with a certain quantity of common air, the whole explodes violently, and a ſmall portion of nitrous acid is produced. If dephlogiſticated air be uſed inſtead of common air, the exploſion is much more violent; Dr Prieſtley ſays 50 times. It is very readily abſorbed by the calces of ſome metals, particularly lead, to which it reſtores its metallic form; and is even decompoſed by keeping it long in a tube made of white glaſs, to which it communicates a black colour by its attraction for the lead in its compoſition. It is produced naturally in coal pits and other mines: where, being mixed with common air, and frequently inflamed by the lights which the miners have along with them, it explodes with prodigious violence, and often produces much miſchief. Sometimes it riſes out of the marſhes, or from the mud at the bottom of ſprings and rivers; in which caſe the water will ſeem to take fire on holding a lighted candle to its ſurface. It is produced from the vapours of rancid oil; whence it has ſometimes been collected in the large bellows uſed in founderies, and burſt them with exploſion. It ſeems alſo to be a natural product of putrefaction of every kind, being ſometimes met with in jakes and privies, where it has exploded as uſual on the approach of a candle. When mixed with common air it may be fired by an electric ſpark, but leſs readily by one from flint and ſteel; though there are inſtances of its taking fire in this manner alſo. In the artificial way, it is moſt uſually procured from iron-filings and diluted vitriolic acid; and lately from the ſteam of water conveyed over iron filings through a red-hot tube. It is likewiſe obtained by diſtillation of wood, coal, &c. and by diſſipating charcoal with the heat of a burning glaſs *in vacuo*. Dr Pennington of Philadelphia informs us, that it reſiſts putrefaction; but its virtues in this way have not been particularly examined.

4. *Nitrous air* is produced from inflammable ſubſtances combined with the nitrous acid; and, according to that claſs of philoſophers ſtyled *Phlogiſtians*, conſiſts of nitrous acid ſuperſaturated with phlogiſton; according to the *Antiphlogiſtians*, it conſiſts of the ſame acid, deprived of a part of its oxygenous principle, the ſame with what the other party call the baſis of dephlogiſticated air. This is the moſt noxious of all the kinds of air hitherto diſcovered; being not only inſtantly fatal to animal life, but to vegetables alſo, as well as extinguiſhing flame in the moſt perfect manner. It has a ſtrong offenſive ſmell; and when mixed with a quantity of dephlogiſticated or common atmoſphereric air, a very conſiderable diminution of the latter takes place, attended with heat, red fumes, and the production of nitrous acid. The diminution is greateſt of all when pure dephlogiſticated air is made uſe of; and with atmoſpheric air is greater or leſs, according to its degree of purity or the quantity of dephlogiſticated air it contains. This

kind of air is a moſt powerful antiſeptic; and has been tried, but without ſucceſs, to preſerve meat freſh for a long time; though for a week or two it might perhaps be uſeful. It is heavier than common air.

5. *Dephlogiſticated air* ſupports animal life and flame in the moſt perfect manner, but is leſs friendly to vegetables; though it ſeems not to poſſeſs any property abſolutely detrimental to them, further than as it contains none, or only a ſmall quantity, of that phlogiſtic matter, which is now found to be the proper food of plants. The heat produced by it in burning bodies ſeems to be very little if at all inferior to that of a large burning mirror. It unites with water but in ſmall quantity; but attaches itſelf ſtrongly to iron when fired in it, cauſing the metal to burn with a bright flame, and being diminiſhed by this combuſtion to a ſurpriſing degree. With other inflammable matters it produces fixed air. It is naturally found in ſea-water, and riſes in ſome waters through the earth. It is produced in the day-time by the leaves of many plants; but not in the night. It is alſo produced from water expoſed to the ſun's light, eſpecially if certain ſubſtances be put into it, of which a particular account is given under the article AEROLOGY. It is alſo produced by the diſtillation of nitre, manganeſe, and other ſubſtances.

6. *Vitriolic-acid air* is not eſſentially different from the fumes of burning ſulphur, only that the latter are always mixed with common air. It is very heavy, and deſtructive both to animal and vegetable life; extinguiſhing flame alſo; and uniting in large quantity with water, from which, however, it is eaſily expelled by heat. By virtue of its properties as an acid, it readily unites with alkaline ſalts. It diſſolves alſo camphor, reducing it to a tranſparent liquor; from which, however, the camphor ſeparates on the affuſion of water. It is produced by diſtilling oil of vitriol mixed with inflammable ſubſtances with a gentle heat.

7. *Marine-acid air* is no other than the vapour of marine acid, which may be procured either by diſtilling the marine acid with a very gentle heat, or the mixture of vitriolic acid, and common ſalt uſually made uſe of for procuring that acid. It is abſorbed largely by water: ſo that a very ſtrong and ſmoking acid liquor can thus be obtained. It is pernicious to animal and vegetable life, but leſs ſo than the two former. It likewiſe extinguiſhes flame: but a candle will burn in common air, though mixed with a large proportion of it; in which caſe the flame appears of a moſt beautiful blue or green colour.

8. *Nitrous-acid air* has been but little examined on account of its extreme corroſive property, by which it deſtroys all kinds of liquids wherewith we attempt to confine it. By the addition of a certain quantity of phlogiſton it is converted into phlogiſticated air, as Dr. Prieſtley found on attempting to confine it by means of whale oil. It is abſorbed by water, and forms nitrous acid; being the vapour of that, as the marine acid air is the vapour of the concentrated marine acid.

9. The *fluor-acid air* is not diſtinct from the vapour of that acid loaded with ſiliceous earth, which it plentifully diſſolves. A full account of its properties is given under the article CHEMISTRY.

10. *Vegetable-acid air* was procured from an exceedingly concentrated acetous acid, but with more difficulty than the others on account of the volatility of the liquid. It extinguiſhes flame, unites with alkalies, and performs every other thing that could be expected from the acetous acid, manifeſting its inferior acid power even in its aerial ſtate. It is very readily imbibed by water and by charcoal. It is likewiſe abſorbed pretty readily by olive oil, on which it has a remarkable effect. The oil takes up about ten times its bulk of the air; and, from being of a yellowiſh colour, turns almoſt as clear as water, loſing alſo ſomewhat of its viſcidity, and approaching to the conſiſtence of an eſſential oil.

A ſingular appearance was obſerved by Dr Prieſtley on attempting to determine how much of this air a certain quantity of water would imbibe. Having put the liquid into a glaſs tube cloſed at one end, and introduced it to the vegetable acid air, a ſmall bubble of common air which appeared at the bottom began to expand, and continued to do ſo till all the water was thrown out of the tube. The ſame effect took place when the tube was hermetically ſealed at the end. With ſpirit of wine it was the ſame, and with oil of turpentine the effect took place more quickly; but with olive oil it was more ſlow.

11. *Alkaline air* is lighter than that of the common atmoſphere, and much more expanſible by heat. It is now found to be compoſed of inflammable and phlogiſticated air. It has all the properties of cauſtic volatile ſpirits, uniting with acids and forming neutral ſalts. It is obtained from a mixture of ſal ammoniac and lime by diſtillation with a very gentle heat; or it may be had in great quantity by diſtilling ſpirit of wine with volatile alkaline ſpirit. It is inflammable when mixed with common air, but burns without any exploſion.

12. *Dephlogiſticated-nitrous air* is produced from the nitrous kind expoſed to liver of ſulphur, or for a longer time to iron. It may alſo be produced directly in the operation for making nitrous air from the acid and iron. After a great quantity of nitrous air has been extricated from this mixture without heat, the dephlogiſticated nitrous air will come over by the application of heat. It is remarkable for being able to ſuſtain flame, without ſupporting animal life. In this kind of air a candle burns ſometimes naturally, and ſometimes with an enlarged flame of a blue or green colour. It is leſs proper as a teſt for the purity of the atmoſphere than common nitrous air.

13. *Sulphurated inflammable air* is a late diſcovery of Dr Prieſtley's, and ſeems to be compoſed of inflammable and hepatic air mixed together.

14. *Hepatic air* is the ſteam which ariſes from liver of ſulphur on the addition of water, but ſtill more copiouſly on the addition of an acid. It is fatal to animal life, and burns without exploſion. Its effect on vegetables is not well known; it is remarkable for the property of giving a black colour to ſome metallic calces, whence it has the property of rendering ſympathetic ink viſible.

15. *Phlogiſticated air* is one of the component parts of the atmoſphere; and is produced in great plenty by all the proceſſes of putrefaction, calcination of metals, and many caſes of combuſtion. It is very deſtructive to animal life, and likewiſe extinguiſhes flame; but it is exceedingly proper for the ſupport of vegetables,

which

GAS.

Plate CCVII.

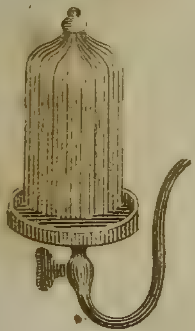


Fig. 9.

Fig. 8.

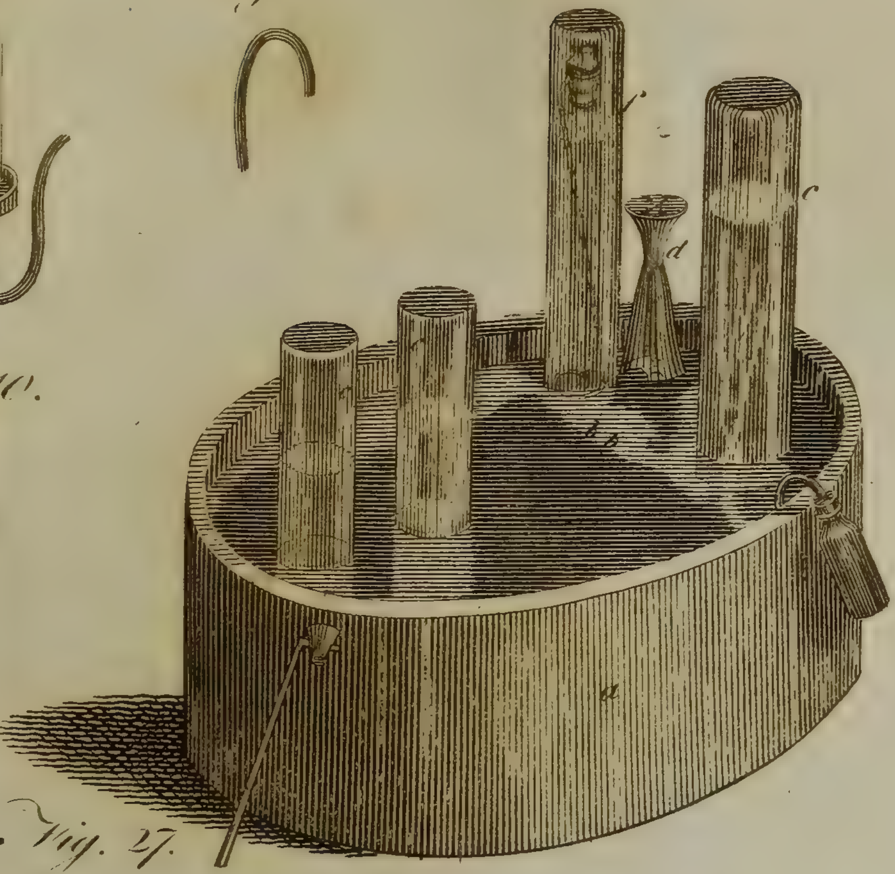
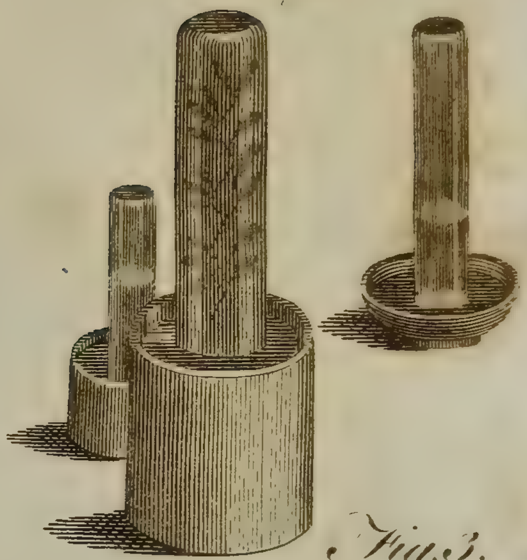


Fig. 1.

Fig. 27.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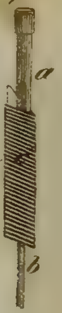
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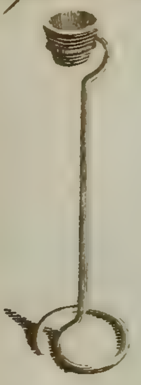
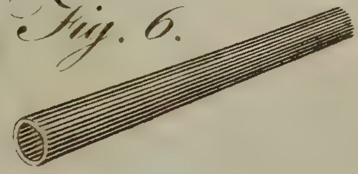


Fig. 3.

Fig. 5.

Fig. 4.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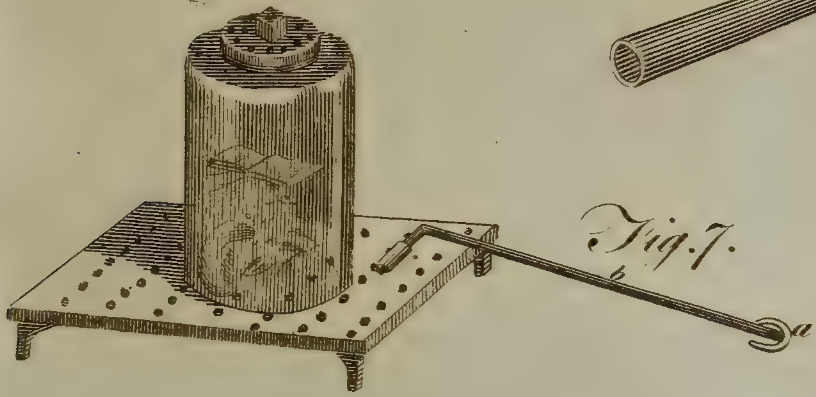


Fig. 26.

Fig. 7.

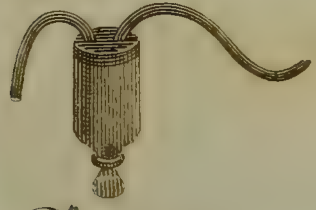


Fig. 15.

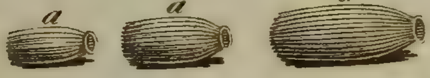


Fig. 13.

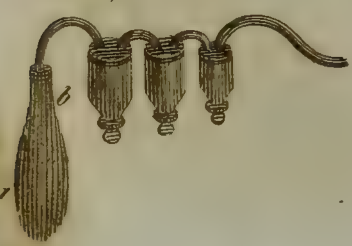


Fig. 16.

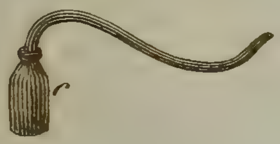


Fig. 14.

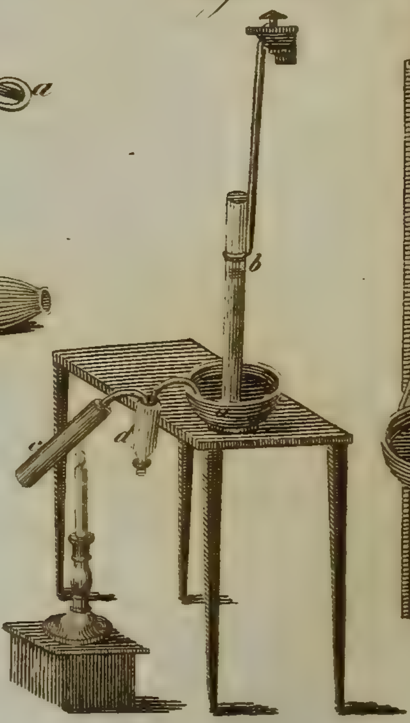


Fig. 12.

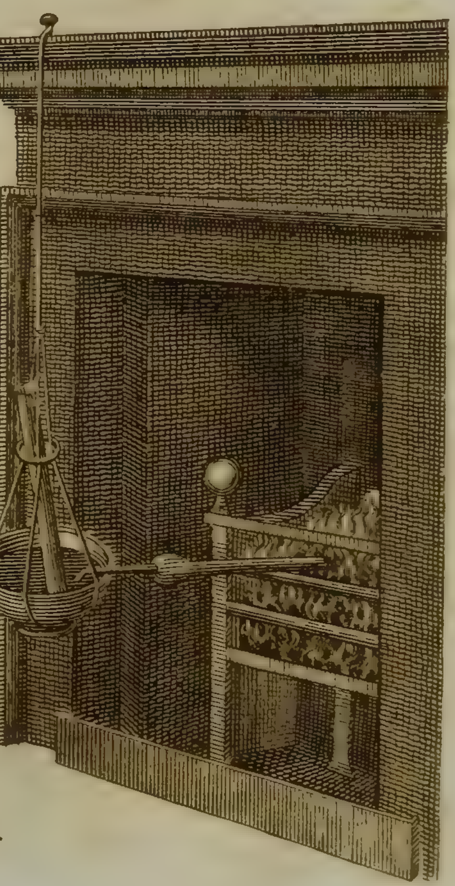


Fig. 11.

which thrive much better in it than in the common air. There are diſputes concerning its compoſition ; The Antiphlogiſtians ſuppoſing it to be a primary element, and their antagoniſts that it is compoſed in great part of phlogiſton ; though they have not been able to prove this part of their doctrine either by reviving the calces of metals, or purifying it in ſuch a manner as to make it reſpirable. It is ſomewhat lighter than atmoſpherical air. Mixed with dephlogiſticated and inflammable air, it produces nitrous acid by detonation. Inflammable, nitrous, and alkaline air, may be partly converted into it.

Having thus briefly recapitulated the properties of the different gaſes hitherto diſcovered, we ſhall next proceed to conſider the apparatus neceſſary for making the various experiments with theſe gaſes, which have been for ſome time in ſo much repute among modern philoſophers. Theſe experiments may be reduced to the following claſſes. 1. The production and preſervation of the gaſes themſelves. 2. The impregnating water or other fluids with them. 3. Trying their effects upon animals and vegetables. 4. The effects produced on them by electricity. 5. Their capacities for conducting heat.

Where one can have acceſs to large quantities of fermenting liquor, fixed air may be eaſily procured of tolerable purity, by filling a vial or tumbler with water, and then emptying it below the ſurface of the mephitic atmoſphere which floats above the ſurface of the liquor, the fixed air occupying the place of the water as it is diſcharged from the veſſel. It may then be preſerved by ſtopping the mouth of the vial with a cork ; or, if it is a wide-mouthed veſſel, by inverting it in quickſilver, or in water covered with oil. In moſt caſes, however, the different kinds of air may be for a ſhort time preſerved in veſſels inverted in water alone without any oil. For experiments, therefore, on thoſe kinds of airs which may be preſerved in water, Dr Prieſtley made uſe of an oblong trough of wood, ſuch as is repreſented, Plate CCVII. fig. 1. The dimenſions were generally two feet in length, 18 inches in breadth, and 11 inches in depth. About an inch below the top is a wooden ſhelf all round, for the purpoſe of ſetting the inverted vials or jars of air upon it. The veſſels he commonly made uſe of were ſuch jars as he had been accuſtomed to uſe in his electrical batteries, about 10 inches long and 2½ wide ; though for different experiments he had them of various ſhapes and ſizes. When he had occaſion to remove veſſels of air from the large trough, he put them into pots or diſhes of the form repreſented fig. 2 ; theſe diſhes being firſt put under water, and the jars then ſlid off the ſhelf upon them. For the mere removal of jars of air from one place to another, where they are to ſtand only for a few days, he makes uſe of common tea-diſhes, which hold water enough, unleſs the air be in a ſtate of diminution by any proceſs going on in the veſſel. When any thing, as a gallipot, is to be ſupported in a jar full of air, wire-ſtands, ſuch as are repreſented fig. 3. may be conveniently made uſe of. They anſwer better than any others, on account of their taking up leſs room, and being eaſily bent into any ſhape. When there is occaſion to pour a quantity of air from one veſſel to another, a funnel, fig. 4. muſt be made uſe of. Thus the operation is rendered exceedingly eaſy, by firſt filling the veſſel in which the air is to be conveyed with water, and holding the mouth of it together with the funnel both under water with one hand, while the other is employed in pouring the air ; which, aſcending through the funnel up into the veſſal, makes the water deſcend, and takes its place. It will be convenient to have ſeveral of theſe funnels of different ſizes. They are beſt made of glaſs. An improvement on this part of the apparatus was made by the Duke de Chaulnes, and conſiſts in having the under part of the ſhelf hollowed out into the ſhape of a funnel, with an hole over the middle, on which the vial is to be placed, and the air aſcends without any trouble. When there is occaſion to transfer air from a jar ſtanding in the trough of water to a veſſel ſtanding in quickſilver, or any other ſituation whatever, the apparatus repreſented fig. 5. may be made uſe of. It conſiſts of a bladder furniſhed at one end with a ſmall glaſs-tube bent, and at the other with a cork perforated in ſuch a manner as juſt to admit the ſmall end of the funnel. When the common air is carefully preſſed out of this bladder, and the funnel thruſt tightly into the cork, it may be filled with any kind of air as eaſily as a glaſs jar. A ſtring being then tied above the cork in which the funnel is inſerted, and the orifice in the other cork cloſed by preſſing the bladder againſt it, it may be carried any where ; and if the tube be carefully wiped, the air may be conveyed quite free from moiſture through a body of quickſilver or any thing elſe. When it is wanted to try whether a candle will burn in any kind of air, a cylindrical glaſs veſſel, fig. 6. may be uſed, with a bit of a wax candle *a* faſtened to the end of a wire *b*, and turned up in ſuch a manner as to be let down into the veſſel with the flame upwards. The veſſel ſhould be kept carefully covered till the moment the candle is admitted.

Fig. 7.

In this manner, the Doctor tells us, he has frequently extinguiſhed a candle more than 20 times ſucceſſively ; though it is impoſſible to dip the candle into it without giving the external air an opportunity of mixing more or leſs with that in the inſide. The candle *c* at the other end is very convenient for holding under a jar ſtanding in water, in order to burn as long as the incloſed air can ſupply it ; for the moment that it is extinguiſhed, it may be drawn through the water before any ſmoke can have mixed with the air. To draw the air out of a veſſel which has its mouth immerſed in water, and thereby to raiſe the liquid to any height that may be required, a glaſs ſyphon is very convenient, ſuch as is repreſented, fig. 8. putting one of the legs up into the veſſel, and drawing the air out at the other end by the mouth, or rather, as moſt of the gaſes have a noxious quality, by a ſyringe properly faſtened to it. Dr Hales ſometimes made uſe of a valve at the top of the veſſel ; but Dr Prieſtley does not think this can be altogether depended upon. If, however, a very ſmall hole be made at the top of a glaſs veſſel, it may be filled to any height by holding it under water while the air is iſſuing out at the hole, which is then to be cloſed with wax or cement. When the gas employed in the experiments is of ſuch a nature that it will neither be abſorbed by water, nor diminiſh common air, it may be convenient to put part of the materials which generate the gas into a cup, as at *f*, fig. 1. Then having, by means of a ſyphon, drawn the air to a convenient height, the ſmall glaſs veſſel may be eaſily puſhed into the cup by a wire introduced through the water. The contents of the ſmall veſſel may be diſcharged into the larger by a variety of contrivances; and the diſtance between the boundary of air and water, before and after the operation, will ſhow the quantity of the generated air. The effect of ſuch ſubſtances as diminiſh air may alſo be tried by this apparatus. When air is to be admitted to any thing that will not bear wetting, and yet cannot be conveniently put into a vial, and eſpecially if it be in the form of powder, and muſt be placed upon a ſtand (as in thoſe experiments in which the focus of a burning mirror is to be thrown upon it), the receiver in which it is to be placed muſt firſt be exhauſted; then having a glaſs tube bent for the purpoſe, as in fig. 9. it is ſcrewed to the transfer of an air-pump on which the receiver had been exhauſted; and introducing it through the water into a jar of air of that kind with which the receiver is to be filled, the purpoſe is gained by only turning the cock: but in this way, unleſs a great deal of care be taken, ſome common air is apt to get into the receiver. If it is wiſhed to try the goodneſs of any particular kind of air, two meaſures of it muſt be put into a jar ſtanding in water; and having marked on the glaſs the exact place of the boundary of the air and water, a meaſure of nitrous air is put to it; and after waiting a proper time, the quantity of its diminution is to be noted. If two kinds of air nearly alike are to be compared together after mixing them in a large jar, the mixture is transferred into a long glaſs tube, by which the ſcale can be lengthened as much as we pleaſe. When the quantity of air, the goodneſs of which we wiſh to aſcertain, happens to be ſo ſmall that it is contained in a portion of a glaſs tube from which water will not run out, as *a* fig. 10. the length of the column of air in the tube is firſt to be meaſured with a pair of compaſſes, the remaining part being filled with water. The length of the column is then to be laid down upon a ſcale; and then thruſting into the tube a wire of a proper thickneſs *b*, it is drawn out again by means of a thin plate of iron bent to a ſharp angle *c*, when the whole of this little apparatus has been introduced through the water into a jar of nitrous air, and the wire being drawn out, the air from the jar muſt ſupply its place. The length of this column of nitrous air is then to be meaſured, and laid down upon the ſcale, ſo as to know the exact length of both the columns. After this, holding the tube under water, the two columns of air are to be forced into contact by means of a ſmall wire; and when they have been a ſufficient time together, the length of the whole is meaſured and compared with the length of both columns taken together.

In many experiments, the matters from which air is to be expelled muſt be ſubject to a very conſiderable degree of heat. In theſe caſes Dr Prieſtley frequently made uſe of a gun-barrel, fig. 11. Into this he put the ſubſtance from which the air was to be extracted; then filling it up with dry ſand ſo that very little air could be lodged in the barrel, and having alſo previouſly burned the ſand, ſo that no air could come from it, he luted to the open end the ſtem of a tobacco-pipe or ſmall glaſs tube. Then having put the cloſed end of the tube which contains the materials into the fire, the generated air, iſſuing through the tube, may be received into a veſſel of quickſilver, with its mouth inverted into a baſon of the ſame, ſuſpended all together by wires as repreſented in the figure. Any other fluid ſubſtance may be uſed inſtead of quickſilver.

The beſt method, however, of procuring air from ſeveral ſubſtances by means of heat, is to put them into vials full of quickſilver, with their mouths immerſed in the ſame, and then throwing the focus of a burning mirror upon them. For this purpoſe the vials ſhould have round bottoms very thin, that they may not be liable to break on any ſudden application of heat. If it is wanted to expel air from any liquid, a vial is to be nearly filled with it; then having a cork perforated, a bent glaſs-tube is put through it and ſecured with cement, repreſented at *e*, fig. 1. The vial is then put into a kettle of water, which is ſet upon the fire and made to boil. The air expelled by the heat iſſues through the tube, and is received in the baſon of quickſilver, fig. 11. But inſtead of this ſuſpended baſon, the ſimple apparatus of a flaccid bladder, tied to the end of the tube in order to receive the generated air, may ſometimes be advantageouſly made uſe of. To produce air by the ſolution of metals, or any ſimilar proceſs, the materials are to be put into a vial prepared in the manner repreſented at *e*, fig. 1. and the end of the glaſs-tube put under the mouth of any veſſel into which it is wanted to convey the air. Heat may be eaſily applied while it hangs in this poſition, by means of a candle or red-hot poker.

In making experiments on ſuch kinds of air as are readily imbibed by water, quickſilver muſt always be made uſe of, as repreſented fig. 12. where *a* is the baſon of quickſilver, *b* a glaſs veſſel containing quickſilver with its mouth immerſed in it, *c* a vial containing the ingredients from which the air is to be produced, and *d* a ſmall recipient or glaſs veſſel to intercept any liquor that may come over along with the air, which muſt be tranſmitted as free from moiſture as poſſible into the veſſel *b*. If there be no danger of moiſture, however, the glaſs-tube only is made uſe of in the manner repreſented at *a*, fig. 1. To invert the veſſel *b*, fig. 12. it muſt firſt be filled with quickſilver, and its mouth then carefully covered with a piece of ſoft leather; after which it may be turned upſide down without any danger of admitting the air; and the leather may be withdrawn when it is plunged into the quickſilver.

The figures *aaa*, fig. 13. repreſent a kind of vials much uſed by Dr Prieſtley in all his experiments. They are made round and very thin at the bottom, and the mouth is to be ground ſmooth, ſo that they may be either uſed with a cork, or will ſtand firm when inverted after being filled with quickſilver or any other fluid. When uſed as common vials with corks, they will bear the application of a ſudden heat without breaking, much better than the common vials which are thickeſt at the bottom. Theſe veſſels are particularly uſeful in extracting air from any ſubſtance confined by quickſilver: for, ſtanding with their mouths downwards, and the ſubſtances with which the experiment is made lying upon the ſurface of the metal, juſt under the thinneſt part of the glaſs, they are eaſily ſubjected to the action of a burning-glaſs without any danger of breaking the vial which contains them. Care muſt be taken, however, not to put them at once into the very focus, leſt the glaſs ſhould give way. In moſt caſes this moderate heat will produce a conſiderable quantity of air ; by which means there will be ſome ſpace left between the glaſs and the ſubſtance from which the air is to be extracted, ſo that the greateſt heat of the glaſs may eaſily be directed upon the ſubſtance itſelf, independent of the glaſs which contains it ; whence the latter is in no danger of being broken or melted. "A ſkilful operator (ſays Dr Prieſtley) will be able to fill his veſſel with the newly generated air by this means: but in general, he will do well to content himſelf with getting it half-full, or leſs ; for as the glaſs is neceſſarily thicker towards the mouth, there will be ſome danger of breaking it when the rays are tranſmitted near that place, and of loſing the air that has been perhaps with great trouble and difficulty procured. If the ſubſtance on which the experiment is made be in form of a powder, ſuch as red-lead, and even many very light ſubſtances, it will be moſt convenient to put them into the veſſel firſt ; and the quickſilver may, with care, be poured upon them afterwards, ſo as to keep the ſubſtance at the bottom ; and yet when the veſſel is inverted it will remain uppermoſt. When the light matter will not lie cloſe, it will not be difficult ſometimes to intercept it in the ſtrait part of that vail at the neck ; but it will often be moſt convenient to form theſe light matters into ſmall balls, and put them into the veſſel through the quickſilver with which it has been previouſly filled. I would obſerve with reſpect to this proceſs, and every other in which veſſels are to be filled with quickſilver, and then to be placed inverted in baſons of the ſame, that no operation is eaſier (unleſs the mouth of the veſſel be exceedingly wide) when the mouth of it is covered with ſoft leather, and, if neceſſary, tied on with a ſtring, before it be turned upſide down ; and the leather may be drawn from under it when it is plunged in the quickſilver. If the mouths of the veſſels be very narrow, it will be ſufficient, and moſt convenient, to cover them with one's finger. In this proceſs there remains leſs doubt of the generated air coming from the materials on which the experiment is made, than when the focus of the lens is thrown upon them in vacuo ; becauſe there will often be room to ſuſpect, that common air may get into the receiver in the courſe of a long proceſs, at ſome place not ſufficiently guarded ; and beſides it is a great ſatisfaction to ſee the quantity of air that is generated at any particular time, during the courſe of a proceſs, that the operator may ſtop when he ſees he has got a quantity ſufficient for his purpoſe, whereas unleſs he has a gage connected with his transferer (which may be inconvenient), he muſt admit water into his receiver before he can certainly tell whether he has obtained any air or not ; and then it will be liable to be affected by the water, or by the air contained in the water, and which will be ſet looſe very copiouſly on its firſt admiſſion into the receiver. But in caſes where the air is apt to corrode the quickſilver, which always happens when the nitrous acid is concerned, recourſe muſt then be had to the vacuum: and for this purpoſe it is neceſſary to have the receivers made as thin as poſſible, the thick ones being very apt to break by the heat of the lens. Care muſt be taken in thoſe experiments to place the materials on a crucible, a piece of glaſs, or ſome ſubſtance of that kind which yields no air."

A vial, with a ground-ſtopper, having the latter perforated with a number of ſmall holes, will be found of excellent uſe to convey any liquid, or even any kind of air contained in it, through the water into a jar ſtanding with its mouth inverted in the liquid, without admitting any mixture of common air or even of the water, and yet the generated air will have a ſufficient outlet. Fig. 14. *c*, repreſents a kind of vial of the ſame form with thoſe ſhown at *aaa*, fig. 13. but fitted with a ground ſtopper terminating in a tube, and which is occaſionally to be uſed inſtead of that marked *e*, fig. 1. In moſt caſes this is preferable to the corks and tubes the Doctor formerly employed ; but in ſome the latter are ſtill to be preferred, particularly where the fluor acid is to be uſed, which would ſoon corrode any of thoſe thin vials. For experiments with this acid, therefore, the Doctor recommends the uſe of common vials made very thick, eſpecially as no great degree of heat or ſudden application of it is ever wanted. The vial *e* will be found ſufficient for any purpoſe that does not require more heat than can be given by the flame of a candle held cloſe to the bottom of it ; but if there be occaſion to place the vial in a ſand-heat, and conſequently if it muſt be put into a crucible placed on the fire, it will be neceſſary to have the tube in which the ground-ſtopple terminates made as long as poſſible, that the veſſel which receives the air may not be too near the fire. Nine or twelve inches will be a ſufficient length for the purpoſe. In ſuch experiments, however, as are not worth the expence of theſe vials and ſtoppers, and yet where gun-barrels cannot be ſafely truſted, the Doctor has recourſe to a vial made narrower at the open end than the other, of about 9 or 12 inches in length, and of an equal thickneſs throughout. When theſe vials are put into a crucible with ſand, the bottom may be made red-hot, while the top is ſo cold that a common cork into which a glaſs tube is inſerted will not be affected by the heat. When the materials are put into this veſſel, it muſt be filled up to the mouth with fine ſand that will give no air by the application of heat ; and the cork muſt be thruſt cloſe down upon the ſand. The air is to be received in the ſame manner as directed for the gun-barrel.

For the purpoſe of making a quantity of air paſs through a body of water or any other fluid, it is convenient to have a number of vials of the form repreſented fig. 15. the tube which conveys the air into the vial going nearly to the under part, and that which delivers it perforating only the upper part. Thus the air is forced to go through the whole body of the water or powder with which the vial may be filled. Theſe veſſels may be of various ſizes, from a pint down to half an ounce ; the larger end may generally be ſtopped with a cork, though in ſome caſes it will be neceſſary to have this ſtopper alſo of glaſs, with only two perforations for inſerting the tubes. Sometimes he had occaſion to uſe a number of theſe veſſels placed together, as repreſented fig. 16. that the ſame air might paſs through them all ; and ſometimes it was found improper to uſe any kind of lute or cement, ſo that all the ſtoppers, large as well as ſmall, were fitted by grinding ; which made the apparatus very expenſive.

penſive. The long vial annexed to this apparatus was chiefly made uſe of where the nitrous acid was concerned. It was made deep in order to admit of a ſudden and violent efferveſcence without any danger of the liquid being thrown over; and the tube proceeding from it ought to be long enough to go to the bottom of any veſſel in which the vapour is to be delivered.

Plate CCVIII.

Fig. 17. repreſents a ſimple apparatus, being no other than a frame of wood ſo diſpoſed about a veſſel containing quickſilver, that the latter may admit of ſeveral glaſs tubes which ſupport themſelves againſt its ſides, and thus may be employed in experiments all at the ſame time.

Fig. 18. ſhows a cylindrical veſſel of tin perforated with holes, and encloſing another of iron wire. A charcoal fire may be made in the outer one, while a vial containing any quantity of air which it is wiſhed to heat may be put within the frame of iron wire. Thus an equable heat will be produced on every part of the glaſs, without heating the bottom more than the reſt; which in many caſes is greatly to be wiſhed for.

Fig. 19. ſhows the apparatus by which were made the principal experiments relating to the apparent converſion of water into air, on which Dr Prieſtley beſtowed conſiderable attention, though he found it at laſt to be a miſtake*. It conſiſts of an earthen veſſel; the bulb of which, containing moiſtened clay, is fixed in the inſide of a glaſs veſſel, through which the heat of a burning lens may be thrown upon it; while the inſide has a communication with a baſon of water or of quickſilver, in which veſſels may be placed to receive the air that is forced through the body of the earthen veſſel, while the water or mercury in the baſon in which the glaſs ſtands riſes to ſupply its place.

Fig. 20. ſhows the apparatus for tranſmitting ſteam through a red-hot tube containing iron or other ſubſtances. The contrivance is evident from an inſpection of the figure; only the veſſel which receives the air muſt be much larger in proportion than is here repreſented. Inſtead of the ſmall furnace, one of Argand's lamps may be advantageouſly uſed. Fig. 21. ſhows a method of receiving the air under a funnel, when large balloons are to be filled for the purpoſes of aeroſtation.

Theſe are the principal parts of the apparatus uſed by Dr Prieſtley in his numerous experiments for the production of airs, of all different kinds, from a vaſt variety of ſubſtances, and for preſerving, transferring, or mingling them with one another as occaſion required. On this part of his apparatus no improvement of any conſequence has ever been made. It has been otherwiſe, however, with the method he propoſed for impregnating water with the various gaſes, eſpecially fixed air, which for ſome time engroſſed a conſiderable ſhare of the public attention. In this operation a principal requiſite is to expoſe as large a ſurface of the water as poſſible to the action of the air; for it is only in proportion to the expanded ſurface, and not to the depth of the liquid, that the air is taken up. It is alſo requiſite to ſave the air as much as poſſible, by ſtopping every outlet, and at the ſame time to prevent the veſſels from burſting, which they might otherwiſe be apt to do. The firſt apparatus invented by Dr Prieſtley, and which ſeems to have alſo been the firſt ever made uſe of by any perſon, is repreſented fig. 22. It conſiſts of a glaſs veſſel *a*, with a pretty narrow neck, but ſo formed that it will ſtand with its mouth downwards; and having filled it with water, lay a ſlip of clean paper or thin paſteboard upon it: then if they be preſſed cloſe together, the veſſel may be turned upſide down without danger of admitting common air into it; and when it is thus inverted, it muſt be placed in another veſſel in the form of a bowl or baſon *b*, with a little water in it, ſo much as to permit the ſlip of paper or paſteboard to be withdrawn, and the end of the pipe *c* introduced. The pipe uſed by the Doctor was at firſt made of leather, that by means of its flexibility he might be able to ſhake the veſſel *d* containing the efferveſcing mixture; but afterwards he found it more convenient to uſe one of glaſs, making uſe of two bladders inſtead of the one repreſented in the figure at *d*. Theſe two are joined together by a perforated cork, and give room enough for ſhaking the veſſel, which one would ſcarcely admit of. Having put the oil of vitriol to the calcareous earth in the bottle *e*, the fixed air will very ſoon diſtend the bladder or bladders *d*, which muſt then be preſſed out into the veſſel *a*, but will not ſuddenly be abſorbed by it. A quantity proportionable to the bulk of the air will therefore deſcend into the baſon; and after the bottle *a* has thus been about half emptied, it will be neceſſary to ſhake it briſkly; when the agitation will cauſe the air to be imbibed, and the water will reaſcend into the bottle. This is to be repeated till the water will not take up any more; after which it ought to be put into a bottle well corked and cemented; the air being very apt to eſcape after being once taken up.

Though this apparatus muſt evidently anſwer the purpoſe of impregnating water with fixed air very effectually, yet it is troubleſome on account of the attendance required; and objections were alſo made to the uſe of bladders in it, as being apt to communicate a diſagreeable taſte to the liquor. The latter objection was particularly inſiſted upon by Dr Nooth; who from his own experience declared, that the uſe of them communicated ſome degree of urinous flavour to the impregnated water. Dr Prieſtley made light of this objection, but allowed the validity of that from the attendance neceſſary during the impregnation. Though he reckoned Dr Nooth's apparatus therefore inferior to his own with regard to its power, and tho' ſlower in its operation as well as more expenſive, he conſtantly uſed it himſelf in his after experiments; and it has now become almoſt univerſally employed for the purpoſe of impregnating ſmall quantities of water with this kind of gas.

Dr Nooth's apparatus, with ſome improvements in it by Mr Parker, is repreſented fig. 23. and is all made of cryſtal glaſs. The lowermoſt veſſel contains the chalk and diluted oil of vitriol; the middle one the water to be impregnated; and the upper one is deſigned to give vent to ſuch part of the air as cannot be imbibed. The air is admitted to the water through a number of holes, ſo ſmall that the water cannot get through them on account of the reſiſtance made by the aſcending gas. The uppermoſt veſſel is filled to a certain height with water, which is prevented from deſcending into the middle veſſel by the reſiſtance of the air

* See *Water*.

air in the empty part. As the gas aſcends, that part of it which is not condenſed compreſſes the water, and forces it up into the upper veſſel, leaving thereby a greater ſpace for the air to expand in; at the ſame time that a conſiderable preſſure is made by the weight of the incumbent water, which very much promotes the abſorption of this or any other gas. The efferveſcing materials may be renewed, and the water drawn off, by the cocks repreſented in the figure. Fig. 24. ſhows a farther improvement upon this apparatus by Mr Blades of Ludgate-hill. The only difference is in the ſhape of the veſſels, and having a glaſs cock for letting off the impregnated water inſtead of a tube cloſed with a cork.

Another apparatus, capable of anſwering the purpoſe at leaſt as well as that of Dr Nooth, and much leſs expenſive, was invented by Dr Withering, and is repreſented fig. 25. A, is a glaſs-veſſel about 10 inches high in the cylindrical part, and 6½ inches diameter. B, a glaſs-veſſel about 12 inches high in the conical part, 1½ in the neck, and 5 inches diameter at the bottom. C, a copper pipe paſſing through the ſtopper of the veſſel B, and tied faſt into the flexible tube D. This tube is made of ſtrong leather, and kept hollow by means of a ſpiral wire running through its whole length. E, a conical braſs-pipe, with a ſtop-cock faſtened to the tube D. F, a conical pipe, with a ſtop-cock G; having the end of the tube E accurately ground to it ſo as to be air tight. G, the ſtop-cock cutting off all communication with the atmoſphere when the pipe E is removed. H H, two large hog's bladders, each of which ought to contain two quarts. I, a ſtop-cock to prevent the water from riſing into the bladders when the veſſel A is agitated. K, a bladder tied to the crooked tube with the ſtop-cock L, which occaſionally opens or ſhuts the communication with the veſſel B. M, a glaſs funnel accurately fitted with the glaſs-ſtopple N. O, the aperture fitted with a glaſs-ſtopper, from which the impregnated water is to be drawn for uſe; or, inſtead of the glaſs-ſtopper, a ſilver-cock may be more conveniently applied. P, the tube opening into the veſſel A.

To make uſe of this apparatus, we muſt, 1. Fill the veſſel A with pure water, adding ſuch other ingredients as are neceſſary along with the gas. The veſſel is calculated to hold five quarts conveniently for impregnation. 2. Put into the veſſel B as much marble or whiting in ſmall lumps as will cover its bottom to the height of two inches, then pour in water to the height repreſented by the dotted line. 3. Let all the bladders be tied round their reſpective tubes, ſo that they may be perfectly air-tight. 4. Fit the mouth of the veſſel A tight with a cork, and through a hole in this paſs the tube P; putting on the cork ſome ſealing-wax of the ſofteſt kind, or elſe modelling wax, ſo that the whole may be made air-tight. 5. Stop the mouth of the veſſel B with a piece of mahogany prepared in the following manner. Let the wood be firſt turned in a lathe of a conical figure, but a little larger than the mouth of the glaſs will admit. Put this piece of wood into melted bees-wax, and heat the wax until the wood begins to grow black. When cool, turn it again in a lathe until it fits the mouth of the veſſel. The tubes C, L, and M, are fitted into holes bored through the wooden ſtopper previous to its being immerſed in the melted bees-wax. 6. Puſh theſe tubes through their reſpective holes in the wooden ſtopper; preſs their ſtopper into the orifice of the veſſel B, and cement the whole with ſealing or modelling wax. 7. Shut the ſtop-cocks I and L, having previouſly preſſed the air out of the bladder K; open the ſtop-cocks G and E; then ſqueeze the air out of the bladder H H; and afterwards preſs the conical pipe E into the pipe F. 8. Pour about a large ſpoonful of oil of vitriol through the funnel M, and ſtop it with its ſtopper N: on this the fixed air riſing through the tube C paſſes into the bladders H H, and diſtends them. 9. When the bladders are diſtended, open the ſtop-cock I, and draw off about a quart of water from the aperture at O. The empty ſpace left by the water will quickly be filled with gas, which the remaining water will begin to abſorb, and the abſorption will ſtill be ſupplied by freſh gas from the bladders; for which reaſon theſe muſt be kept pretty fully diſtended, by adding more oil of vitriol when they begin to grow flaccid. 10. If it be required to impregnate the water quickly, turn the ſtop-cocks at G and E, and open that at E; then ſeparate the pipe E from the tube F, and agitate the veſſel A. During this time the fixable air that is produced paſſes into the bladder K, from whence it may be afterwards preſſed into the other bladders when the parts of the apparatus are again united. 11. During the agitation cloſe the ſtop-cock at I, opening it only occaſionally to replace from the bladders H H the air abſorbed by the water. 12. If a ſtrong impregnation be deſired, the temperature of the room where the operation is carried on ought not to be more than 48° of Fahrenheit. 13. That the cocks may continue perfectly air-tight, it will be neceſſary to ſupply them once a-year with a very ſmall quantity of unſalted lard. Modelling wax, of which mention is made in this deſcription, may be made by adding two ounces of tallow and one of turpentine to half a pound of bees-wax. It may be coloured with red-lead or Spaniſh-brown; and the mixture muſt be kept ſtirring till cold.

Theſe are the principal diſcoveries which have yet been made concerning the method of impregnating water with fixed air, and they may undoubtedly be applied to the impregnation of that fluid with any other kind of gas which it will take up; only it muſt be obſerved, that where any of the acids are concerned, that of fluor alone excepted, there is an abſolute neceſſity for having all parts of the apparatus made of glaſs.

Plate CCVII

For making experiments on vegetables, the large cylindrical glaſs, fig. 2. is very proper. When it was wiſhed to try how long a ſmall animal would live in a certain quantity of air, Dr Prieſtley found a large beer-glaſs, ſuch as is repreſented at *d*, fig. 1. very convenient. The animals he moſt commonly made experiments upon were mice; and in a beer-glaſs containing between two and three ounces, he found that one of theſe creatures would live 20 minutes or half an hour. To obtain mice for ſuch experiments, he directs that they ſhould be caught in wire-traps, from whence they may be eaſily taken. To get them into the air, they muſt be paſſed through the water into the veſſel containing it. The wet they ſuſtain on this occaſion does them no hurt; but if the air is of ſuch a quality that it is expected the mouſe can live any time, it muſt have ſomething to ſit upon out of the reach of the water. Where this is not the caſe, it will be proper to hold the animal by the tail, in order to withdraw it as ſoon as poſſible; but if the air has been thoroughly noxious, it will be irrecoverable by a ſingle inſpiration. The mice are kept in receivers open at top and bottom, ſtanding upon plates of tin perforated with many holes, and covered with others of the ſame kind to admit the air, kept down with weights, as in fig. 26. A quantity of paper or tow muſt be put into the veſſel, and changed every two or three days in order to clean it; for which purpoſe it is proper to have another receiver of the ſame kind ready cleaned to hold them in. Theſe animals muſt be kept in a place of a moderate temperature, either too much heat or too much cold being prejudicial to them. The place where Dr Prieſtley kept his had a temperature of about 70° of Fahrenheit. When they had been made to paſs through water, it was neceſſary to give them a conſiderable degree of heat in order to dry and warm them. In the courſe of his experiments he found, that mice will live entirely without water; for though he kept them for three or four months, and ſeveral times offered them water, they would never taſte it; notwithſtanding which they continued in perfect health and vigour. Two or three of them will live very peaceably together in the ſame veſſel; though the Doctor had one inſtance of a mouſe tearing another almoſt in pieces, when there was plenty of proviſions for both.

Some difficulty may occur in opening the mouth of a phial containing any kind of ſubſtance to which water muſt not be admitted in a jar of air; but this will eaſily be overcome, by having a cork cut tapering with a ſtrong wire thruſt through it, as in fig. 27. for thus it will eaſily fit the mouth of any phial; and by holding the phial in one hand, and plunging both into the trough of water, the phial can eaſily be conveyed through the water into the jar; which muſt either be held by an aſſiſtant, or be faſtened by ſtrings with its mouth projecting over the ſhelf. When the phial is thus conveyed into the jar, the cork may eaſily be removed, and put in again at pleaſure.

Plate CCVIII.

Fig. 28. repreſents an apparatus for determining the conducting power of air with regard to heat. It conſiſts only of a jar, which may be filled with any kind of air, with a very ſenſible thermometer inſerted in it, as repreſented in the figure. The ſcale of this was ſo large, that the Doctor could mark upon it 20 diviſions, each larger than half an inch, between the mean temperature of the atmoſphere and a heat much below that of boiling water. By frequent trials he at laſt adjuſted it in ſuch a manner, that having filled the veſſel with any kind of air, he could plunge it firſt in hot and then in cold water, ſo that the mercury would riſe to the diviſion 20 and fall to that of 6 or 7 in no great time; and thus, by means of a clock which beat ſeconds, he could not well make a miſtake of more than two in noting down any particular diviſion. The hot water was always made to boil, and the cold water was always brought freſh from the ſame pump. The mouth of the air-veſſel was placed in a cup of mercury kept always at the ſame height; ſo that he could thus try any kind of air with as much accuracy as one would think were poſſible. Notwithſtanding this, however, he could not thoroughly ſatisfy himſelf with the reſults; at leaſt he has not yet thought proper to publiſh fully the reſults of his experiments. The differences, he ſays, were leſs ſtriking than he expected. Inflammable air, however, appeared to conduct heat better than any other; the mercury aſcending the ſame ſpace in half the time in it that it took up in common air. Fixed air, and all the acid airs, were conſiderably worſe than common air. Alkaline air was a little better, and dephlogiſticated air a little worſe, than common air; but the reſult of this laſt experiment was uncertain.

The electric ſpark is eaſily taken in any kind of air by filling a ſmall tube with the air deſired, with two wires approaching within ſtriking-diſtance of each other in the middle.

We ſhall cloſe this account of the apparatus for making experiments on gaſes with an account of an inſtrument invented by Dr Pearſon of London for collecting air of any kind which eſcapes in bubbles from the ſurface of ſprings or rivers. It conſiſts of a funnel inſerted into a phial in ſuch a manner that the gas as it iſſues through the water may come under the funnel, and thus riſe into the phial. For the convenient holding it to receive the air from any place where it may iſſue copiouſly, it is furniſhed with a handle and a ring, to which the funnel is tied by ſprings, as repreſented fig. 29.

GASCOIGNE (Sir William), chief juſtice of the court of king's bench under Henry IV. A moſt learned and upright judge; who being inſulted on the bench by the then prince of Wales, afterwards Henry V. with equal intrepidity and coolneſs committed the prince to priſon; and by this ſeaſonable fortitude laid the foundation of the future glory of that great monarch, who from this event dated his reformation from the licentiouſneſs of his youth. It is not well authenticated that the prince ſtruck Sir William, as recorded by Shakeſpeare; but all authors agree, that he interrupted the courſe of juſtice to ſcreen a lewd ſervant. Sir William died in 1413.

GASCOIGNE (George), an Engliſh poet of ſome fame in the early part of the reign of queen Elizabeth, was born at Walthamſtow in Eſſex, of an ancient family, and educated at both univerſities, but principally at Cambridge. From thence he removed to Gray's Inn, and commenced ſtudent of the law; but having a genius too volatile for that ſtudy, he travelled abroad, and for ſome time ſerved in the army in the Low Countries. He afterwards went to France; where he became enamoured of a Scottiſh lady, and married her. Being at length, ſays Wood, *weary of thoſe vanities*, he returned to England; and ſettled once more in Gray's Inn, where he wrote moſt of his dramatic and other poems. The latter part of his life he ſpent in his native village of Walthamſtow, where he died in the year 1578. He had the character of a polite gentleman, an eloquent and witty companion, *et vir inter poetas ſui ſeculi præſtantiſſimus*. His plays, firſt printed ſeparately, were afterwards, with ſeveral other poems, &c. reprinted in two volumes 4to; the firſt volume in 1577, the ſecond in 1587.

GASCOIN, or GASCOIGN, denotes the hinder thigh of a horſe, which begins at the ſtifle, and reaches to the ply or bending of the ham.

GASCONADE, a boaſt or vaunt of ſomething very improbable. The term has its riſe from the Gaſcons, or people of Gaſcony in France, who it ſeems have been diſtinguiſhed for bragging and rhodomontado.

GASCONY, the moſt ſouth-weſt province of France, is bounded by Guienne on the north, by Languedoc on the eaſt, by the Pyrenees which ſeparate it from Spain on the ſouth, and by the Bay of Biſcay on the weſt. It had its name from the ancient inhabitants called *Gaſcones*, or *Vaſcones*; by the moderns *Baſques*, or *Vaſques*. After theſe were ſubdued by the Franks, they had for ſome time dukes of their own, who were ſubject to the dukes of Aquitaine; but both were at laſt diſpoſſeſſed by the kings of France. The country produces corn, wine, fruits, tobacco, hemp, brandy, prunes, &c. The inhabitants are noted for a corrupt and vicious pronunciation of the French tongue, as well as their vain-glorious boaſting.

GASSENDI (Peter), one of the moſt celebrated philoſophers France has produced, was born at Chanterſier, about three miles from Digne in Provence, in 1592. When a child, he took a particular delight in gazing at the moon and ſtars as often as they appeared in clear unclouded weather. This pleaſure frequently drew him into bye-places, in order to feaſt his eye freely and undiſturbed; by which means his parents had him often to ſeek, not without many anxious fears and apprehenſions. They therefore put him to ſchool at Digne; where, in a ſhort time, he made ſuch an extraordinary progreſs in learning, that ſome perſons, who had ſeen ſpecimens of his genius, reſolved to have him removed to Aix, in order to ſtudy philoſophy under Feſay, a learned minor friar. This propoſal was ſo diſagreeable to his father, who intended to breed him up in his own way to country buſineſs, as being more profitable than that of a ſcholar, that he would conſent to it only upon condition that he ſhould return home in two years at fartheſt. Accordingly young Gaſſendi, at the end of the appointed time, repaired to Chanterſier: but he had not been long there when he was invited to be profeſſor of rhetoric at Digne, before he was quite 16 years of age; and he had been engaged in that office but three years, when his maſter Feſay dying, he was made profeſſor in his room at Aix. When he had been there a few years, he compoſed his Paradoxical Exercitations; which, coming to the hands of Nicholas Peireſc, that great patron of learning joined with Joſeph Walter prior of Valette in promoting him; and he having entered into holy orders, was firſt made canon of the church of Digne and doctor of divinity, and then obtained the wardenſhip or rectorſhip of that church. Gaſſendi's fondneſs for aſtronomy grew up with his years; and his reputation daily increaſing, he was in 1645 appointed royal profeſſor of mathematics at Paris. This inſtitution being chiefly deſigned for aſtronomy, our author read lectures on that ſcience to a crowded audience. However, he did not hold this place long; for a dangerous cough and inflammation of the lungs obliged him, in 1647, to return to Digne for the benefit of his native air.—Gaſſendi wrote againſt the metaphyſical meditations of Des Cartes; and divided with that great man the philoſophers of his time, almoſt all of whom were Carteſians or Gaſſendians. He joined to his knowledge of philoſophy and the mathematics an acquaintance with the languages and a profound erudition. He wrote, 1. Three volumes on Epicurus's Philoſophy; and ſix others, which contain his own philoſophy. 2. Aſtronomical Works. 3. The Lives of Nicholas de Peireſc, Epicurus, Copernicus, Tycho Brahe, Puerbachius, and Regiomontanus. 4. Epiſtles, and other treatiſes. All his works were collected together, and printed at Lyons in 1658, in ſix volumes folio. He died at Paris in 1655, aged 63.

GASTEROSTEUS, the STICKLE-BACK, in ichthyology, a genus of fiſhes belonging to the order of thoracici. There are three rays in the membrane of the gills; the body is carinated; and there are ſome diſtinct prickles before the back-fin. There are 11 ſpecies diſtinguiſhed by the number of prickles on the back. One of theſe ſpecies, the aculeatus, ſtickleback, bauſticle, or ſharpling, is common in many of the Britiſh rivers. In the fens of Lincolnſhire, and ſome rivers that proceed from them, they are found in prodigious quantities. At Spalding there are once in ſeven or eight years amazing ſhoals that appear in the Welland, and come up the river in form of a vaſt column. They are ſuppoſed to be the multitudes that have been waſhed out of the fens by the floods of ſeveral years, and collected in ſome deep hole, till overcharged with numbers, they are periodically obliged to attempt a change of place. The quantity is ſo great, that they are uſed to manure the land, and trials have been made to get oil from them. A notion may be had of this vaſt ſhoal, by being informed, that a man being employed by the farmer to take them, has got for a conſiderable time four ſhillings a-day by ſelling them for a halfpenny per buſhel.—This ſpecies ſeldom reaches the length of two inches; it hath three ſharp ſpines on the back, that can be raiſed or depreſſed at pleaſure. The colour of the back and ſides is an olive-green; the belly white: but in ſome the lower jaws and belly are of a bright crimſon.

GAST-HOUND. See *GAZE-Hound*.

GASTRELL (Francis), biſhop of Cheſter, was born in 1662, appointed preacher to the ſociety of Lincoln's Inn in 1694, and made biſhop of Cheſter in 1714. He preached a courſe of ſermons for Boyle's lectures; engaged in the Trinitarian controverſy with Mr Collins and Dr Clarke; and publiſhed two excellent pieces, the one, intitled, Chriſtian Inſtitutes, and the other, a Moral Proof of a Future State. He vindicated the rights of the univerſity of Oxford againſt the archbiſhop of Canterbury, in the appointment of the warden of Mancheſter college; and oppoſed the violent proceedings againſt biſhop Atterbury in the houſe of lords, though he diſliked the biſhop as a man of arbitrary principles. He died in 1725.

GASTRIC, in general, ſomething belonging to the ſtomach.

GASTRIC-Juice, a thin pellucid liquor, which diſtills from certain glands in the ſtomach, for the dilution, &c. of the food. See ANATOMY, Sect. XIII.

GASTROCNEMIUS, in anatomy. See ANATOMY, *Table of the Muſcles*.

GASTROMANCY, or GASTROMANTIA, a kind of

divination practiſed among the ancients by means of words coming or ſeeming to come out of the belly.

The word is Greek, γαςρομαντεια, compoſed of γαςηρ *belly*, and μαντεια *divination.*

There is another kind of divination called by the ſame name *gaſtromancy*, which is performed by means of glaſſes or other round tranſparent veſſels, within which certain figures appear by magic art. It is thus called, becauſe the figures appear as in the belly of the veſſels.

GASTRORAPHY, in ſurgery, the operation of ſewing up wounds of the abdomen. See Surgery.

GASTROTOMY (of γαςερ, and τεμνο, *I cut)*, the operation of cutting open the belly; otherwiſe called the *Cæſarian ſection.* See Midwifery.

GATAKER (Thomas), a learned critic and divine, was born at London in 1574, and ſtudied at St John's college, Cambridge. He was afterwards choſen preacher at Lincoln's Inn; which he quitted in 1611, for the rectory of Rotherhithe in Surry. In 1620, he made a tour through the Low Countries; and in 1624, publiſhed at London a book, intitled, Tranſubſtantiation declared by the Confeſſion of the Popiſh Writers to have no neceſſary foundation in God's Word: he wrote likewiſe a defence of this diſcourſe. In 1642, he was appointed one of the aſſembly of divines, and was engaged with them in writing annotations upon the Bible. He died in July 1654, in the 80th year of his age. Beſides the above works, he publiſhed, 1. A Diſſertation upon the Style of the New Teſtament. 2. *De nomine tetragrammata.* 3. *De dipthongis, ſive bivocalibus.* 4. An Edition and Tranſlation of the Emperor Marcus Antoninus's Meditations. 5. A Collection of Sermons, in folio; and many other works. His piety and charity were very exemplary; and his modeſty ſo great, that he declined all eccleſiaſtical dignity and court-preferments. His extenſive learning was admired by Salmaſius and other great men abroad; his houſe was a private ſeminary for young gentlemen of the nation, and many foreigners reſorted to him to receive advice in their ſtudies.

GATE, in architecture, a large door, leading or giving entrance into a city, town, caſtle, palace, or other conſiderable building. See Architecture.

Thebes, in Egypt, was anciently known by the appellation *with a hundred gates.* In ancient Rome there was a triumphal gate, *porta triumphalis.* In modern Rome there is the *jubilee gate*, which is only opened in the year of a grand jubilee.

The gates of London were many of them converted into gaols or priſons, as Ludgate, Newgate, &c. but they are now removed. The leſſer or by-gates are called *poſterns.* Gates, through which coaches, &c. are to paſs, ſhould not be leſs than 7 feet broad, nor more than 12; the height to be $1\frac{1}{2}$ the breadth.

Gate, or Gait, in the manege, called in French *train*, is uſed for the going or pace of a horſe.

Gate, in a military ſenſe, is made of ſtrong planks, with iron bars, to oppoſe an enemy. They are generally made in the middle of the curtin, from whence they are ſeen, and defended by the two flanks of the baſtions. They ſhould be covered with a good ravelin, that they may not be ſeen or enfiladed by the enemy. Theſe gates, belonging to a fortified place, are paſſages through the rampart, which may be ſhut and opened by means of doors and a portculliſs. They are either private or public.

Private gates are thoſe paſſages by which the troops can go out of the town unſeen by the enemy, when they paſs to and from the relief of the duty in the outworks, or on any other occaſion which is to be concealed from the beſiegers.

Public gates are thoſe paſſages through the middle of ſuch curtins, to which the great roads or public ways lead. The dimenſions of theſe are uſually about 13 or 14 feet high, and 9 or 10 feet wide, continued through the rampart, with proper receſſes for foot paſſengers to ſtand in out of the way of wheel carriages.

Gates of Hell. This expreſſion is uſed in ſcripture, to denote figuratively either the *grave* or the *powers of darkneſs*, i. e. the devil and his angels.

The Mahometans uſe the expreſſion literally, and ſuppoſe that hell has ſeven gates. The firſt is that where Muſſulmans, who incur the guilt of ſin, will be tormented. The ſecond is for the Chriſtians. The third is for the Jews. The fourth for the Sabians. The fifth for the Magians or worſhippers of fire. The ſixth for Pagans and idolaters. And the ſeventh for hypocrites, who make an outward ſhow of religion, but have none.

GATESHEAD, in the county of Durham, is as it were the ſuburbs of Newcaſtle, though it lies in another county, being divided by the river Tyne; over which there is a fine ſtone-bridge, with an iron-gate in the middle, having the arms of Durham on one ſide, and thoſe of Newcaſtle on the other, which is the boundary between the biſhoprick and Northumberland. The church is a fine building, with a very high tower, ſeen at a great diſtance; and in the church-yard are ſeveral ancient monuments. There are few traces left of its ancient monaſtery, except a ſtone gateway, or rather a modern erection. The houſe covered two acres and a half of land. Here live the coal-pit men.

GATH, or Geth (anc. geog.), a celebrated city of the Philiſtines, and one of their five principalities. It is famous for having given birth to Goliah. David made a conqueſt of it in the beginning of his reign over all Iſrael; and it continued ſubject to the kings his ſucceſſors till the declenſion and decay of the kingdom of Judah. Rehoboam rebuilt or fortified it; king Uzziah retook it, and Hezekiah once more reduced it under his ſubjection.

Gath ſtood about five or ſix miles from Jamnia, about 14 ſouth of Joppa, and 32 weſt of Jeruſalem. Hence ſome authors (among whom is F. Calmet) have committed an egregious miſtake in making Gath the moſt ſouthern, and Ekron the moſt northern, of the Philiſtine cities; as if theſe two had been the two boundaries of their dominions, whereas theſe two cities are not above five miles aſunder; and Gaza is the laſt of the five ſatrapies ſouth. And Joſephus (in the place already quoted) expreſſes himſelf plainly enough, when he ſays, that Hezekiah took all the Philiſtine cities from Gaza to Gath; there being many more cities of that name, which ſignifies in the Hebrew a *wine-preſs.* Several more of the name of Geth or Gath are mentioned in Euſebius and St Jerom, whoſe

ſituation,

GAS

Plate CCVIII.

Fig. 20.

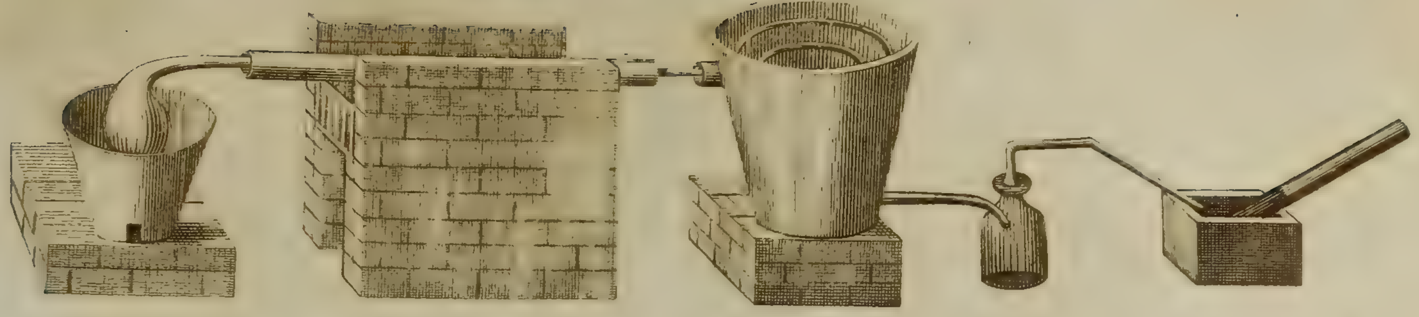


Fig. 18.

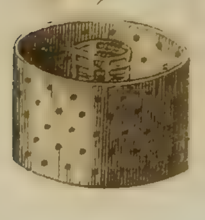


Fig. 24.

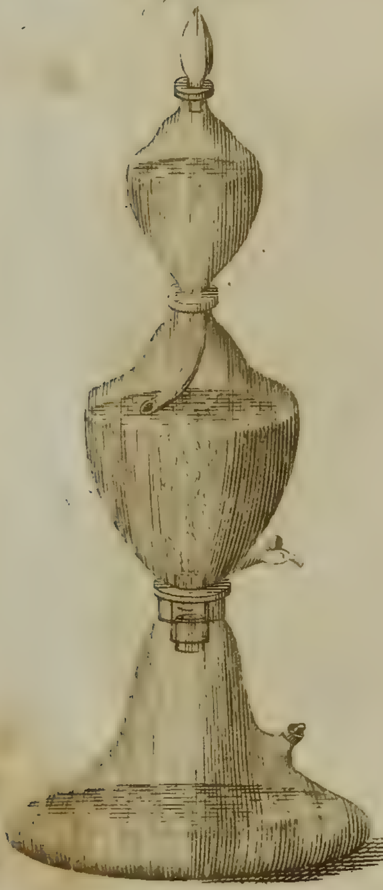


Fig. 23.

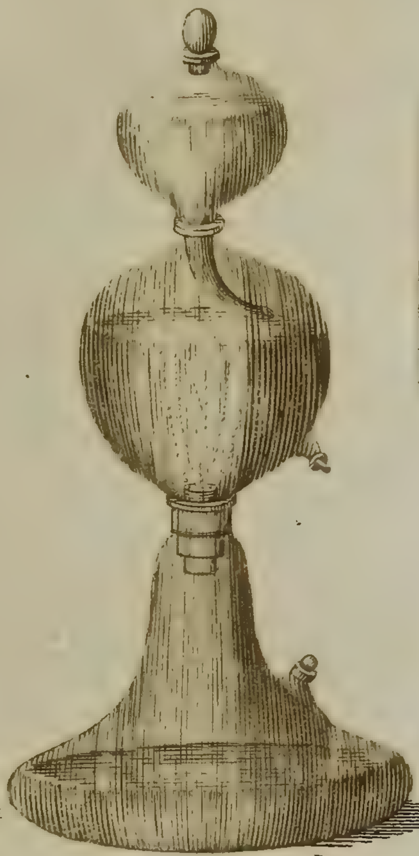


Fig. 17.

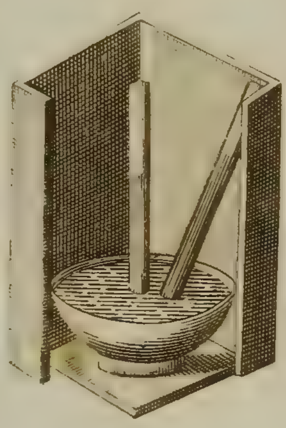


Fig. 21.

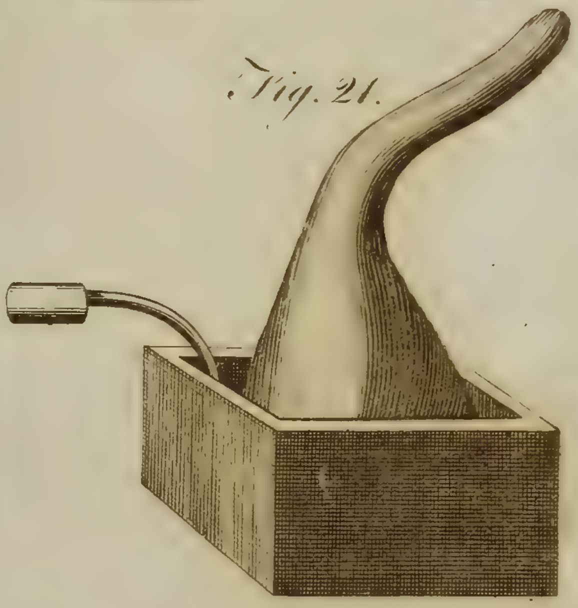


Fig. 28.

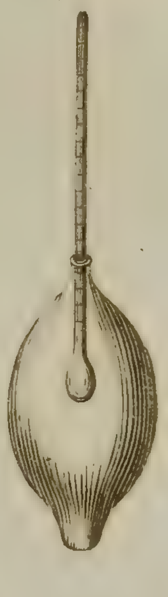


Fig. 22.

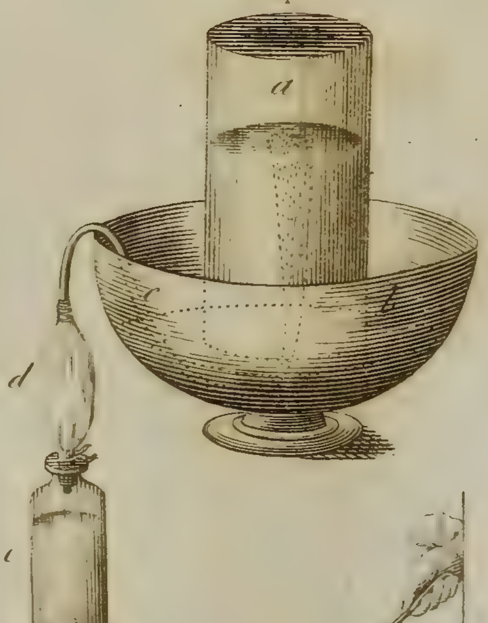


Fig. 25.

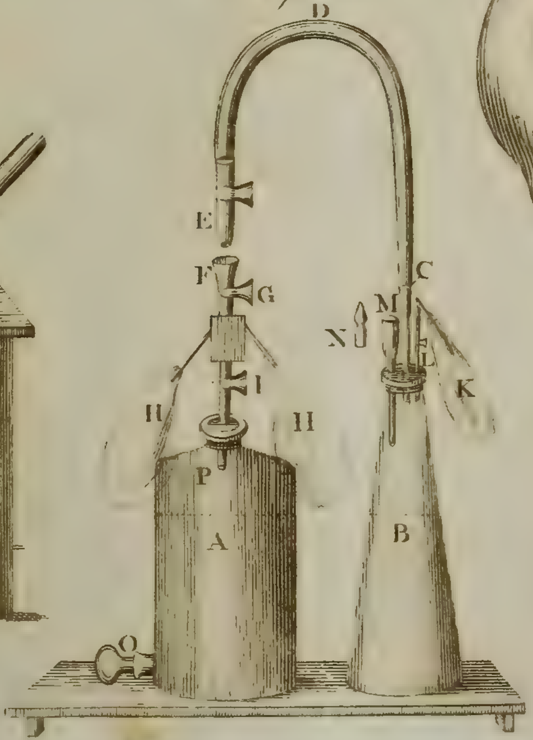


Fig. 19.

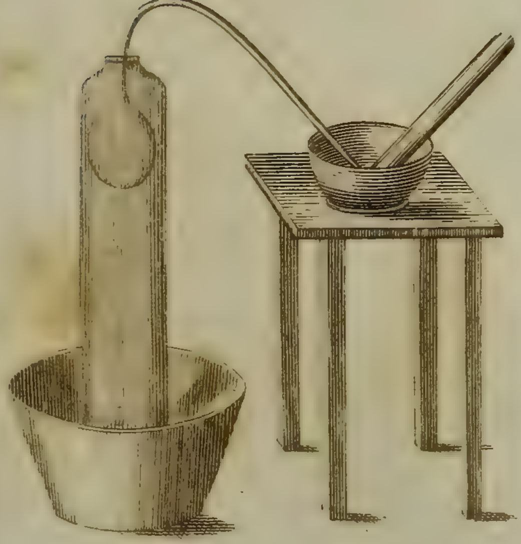
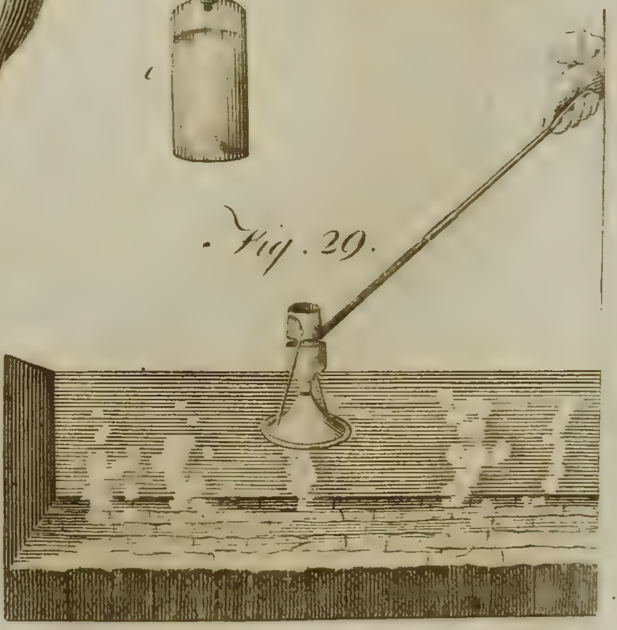


Fig. 29.



ſituation, according to them, plainly ſhows them to have been different places from this, and from each other; beſides thoſe which had an adjunct to diſtinguiſh them.

This city recovered its liberty and luſtre in time of the prophets Amos and Micah; but was afterwards demoliſhed by Hazael king of Syria, ſince which it became of but little conſideration till the time of the holy war, when Fulk king of Jeruſalem built a caſtle on its ruins.

Gath-Opher, *Gath-Epher*, or *Gath*, in the canton of Opher, in Galilee, was the birth place of the prophet Jonah. Joſhua makes this city to be part of the tribe of Zebulon; and St Jerom, in his preface upon Jonah, ſays, that it was two miles from Sephoris, otherwiſe called *Diocæſarea*.

Gath-Rimmon, a city belonging to the tribe of Dan. St Jerom places it ten miles from Dioſpolis on the way from Eleutheropolis. It was given to the Levites of Kohath's family.

Gath-Rimmon, was alſo a city in the half-tribe of Manaſſeth, on this ſide Jordan, and was alſo given for a place of abode in the Levites of Kohath's family.

Gath-Rimmon, was likewiſe a city in the tribe of Ephraim, given to the Kohathites.

GATTON, a borough in the county of Surry, 19 miles from London. It lies under the ſide of a hill going to Reygate; and is ſuppoſed to have been known to the Romans by reaſon of their coins and other antiquities that have been found here. It is a borough by preſcription; and has ſent members to parliament ever ſince the 29th of Henry VI. It was formerly a large town; but is now a mean village, with a ſmall church, and without either fair or market. The members are returned by its conſtable, who is annually choſen at the lord of the manor's court.

GAUBIUS (Hieronymus David), a celebrated phyſician of Holland. He ſtudied under the illuſtrious Boerhaave; and became ſo much the favourite of his profeſſor, that he reſigned the chemical chair in his favour. He taugh at Leyden with great applauſe for 40 years. In the year 1775 he laid down his office, as being no longer able to ſupport the fatigues of it. He was ſucceeded by John David Hahns, then profoſſer at Utrecht. His reputation was extended all over Europe by ſeveral valuable publications, and particularly by his *Inſtitutiones Pathologiæ Medicinalis*, and his *Adverſaria*, which have contributed not a little to the improvement both of the theory and practice of medicine. He died at Leyen 29th November 1780, in the 76th year of his age.

GAUDEN (Dr Joſeph), ſon of John Guaden vicar of Mayfield in Eſſex, was born there in 1605. At the commencement of the civil war, he was chaplain to Robert earl of Warwick; who taking part with the parliament againſt the king, was followed by his chaplain. Upon the eſtabliſhment of the preſbyterian model of church-government, he complied with the ruling powers, and was nominated one of the aſſembly of divines who met at Weſtminiſter in 1643, and took the covenant; yet having offered ſome ſcruples and objections to it, his name was afterwards ſtruck out of the liſt. Nor did he eſpouſe the parliament cauſe any longer than they adhered to their firſt avowed principles of reforming only, inſtead of deſtroying, monarchy and epiſcopacy. In this ſpirit he was one of thoſe divines who ſigned a proteſtation to the army, againſt the violent proceedings that affected the life of the king: and a few days after his execution publiſhed the famous Εικων Βασιλικη, *A Portraiture of his Sacred Majeſty in his Solitude and Sufferings*; which ran through 50 editions in the courſe of a year. Upon the return of Charles II. he was promoted to the ſee of Exeter; and in 1662 was removed to Worceſter, much to his regret, having flattered himſelf with the hopes of a tranſlation to Wincheſter; and his death happened the ſame year. He wrote many controverſial pieces ſuited to the circumſtances of the times, and to his own views from them. The *Eikon Baſilike* abovementioned he publiſhed as the king's private meditations: though on this point there has been a long controverſy. After the biſhop's death, his widow, in a letter to one of her ſons, calls it *The Jewel*: and ſaid her huſband had hoped to make a fortune by it; and that ſhe had a letter of a very great man's, which would clear up that he writ it. This aſſertion, as the earl of Clarendon had predicted, was eagerly eſpouſed by the anti-royaliſts, in the view of diſparaging Charles I. But it has been obſerved, that Gauden had too luxuriant an imagination, which betrayed him into a rankneſs of ſtyle in the Aſiatic way; and from thence, as biſhop Burnet argues with others, it may be certainly concluded, that not he, but the king himſelf, was the true author of the Εικων Βασιλικη: in which there is a nobleneſs and juſtneſs of thought, with a greatneſs of ſtyle, that made it be looked on as the beſt written book in the Engliſh language.

GAVEL, or Gabel, among builders. See Gabel.

Gavel, in law: tribute, toll, cuſtom, or yearly revenue; of which there was in old time ſeveral kinds. See Gabel.

Gavel-Kind, a tenure or cuſtom belonging to lands in the county of Kent. The word is ſaid by Lambard to be compounded of three Saxon words, *gyfe*, *eal*, *kyn*, "*omnibus cognatione proximis data*." Verſtegan calls it *gavelkind*, quaſi "give all kind," that is, to each child his part: and Taylor, in his hiſtory of *gavelkind*, derives it from the Britiſh *gavel*, i. e. a hold or tenure, and *cenned*, "*generatio* aut *familia*;" and ſo *gavel cenned* might ſignify *tenura generationis*.—It is univerſally known what ſtruggles the Kentiſh men made to preſerve their ancient liberties, and with how much ſucceſs thoſe ſtruggles were attended. And as it is principally here that we meet with the cuſtom of gavelkind (though it was and is to be found in ſome other parts of the kingdom), we may fairly conclude, that this was a part of theſe liberties; agreeable to Mr Selden's opinion, that gavelkind, before the Norman conqueſt, was the general, cuſtom of the realm. The diſtinguiſhing properties of this tenure are various: ſome of the principal are thoſe. 1. The tenant is of age ſufficient to alienate his eſtate by feoffment, at the age of 15. 2. The eſtate does not eſcheat in caſe of an attainder and execution for felony; their maxim being, "the father to the bough, the ſon to the plough." 3. In moſt places he had a power of deviſing lands by will, before the ſtatute for that purpoſe was made. 4. The lands deſcend, not to the eldeſt, youngeſt, or any one ſon only, but to all the ſons together; which was indeed anciently the moſt uſual courſe of deſcent all over England, though in particular places particular cuſtoms prevailed.

GAVELET, in law an ancient and ſpecial ceſſavit uſed in Kent, where the cuſtom of gavelkind continues, by which the tenant, if he withdraws his rent and ſervices due to the lord, forfeits his lands and tenements.

The proceſs of the gavelet is thus. The lord is firſt to ſeek by the ſteward of his court, from three weeks to three weeks, to find ſome diſtreſs upon the tenement, till the fourth court; and if at that time he find none, at this fourth court it is awarded, that he take the tenement in his hand in name of a diſtreſs, and keep it a year and a day without manuring; within which time, if the tenant pay his arrears, and make reaſonable amends for the witholding, he ſhall have and enjoy his tenement as before: if he come not before the year and day be paſt, the lord is to go to the next county-court, with witneſs of what had paſſed at his own court, and pronounce there his proceſs, to have further witneſſes; and then by the award of his own court, he ſhall enter and manure the tenements as his own: ſo that if the tenant deſired afterwards to have and hold it as before, he muſt agree with the lord; according to this old ſaying: "Has he not ſince any thing given, or any thing paid, then let him pay five pound for his were, e're he be come healder again." Other copies have the firſt part with ſome variations; "Let him nine times pay, and nine times repay."

Gavelet, in London, is a writ uſed in the huſtings, given to lords of rents in the city of London. Here the parties, tenant and demandant appear by *ſcire facias*, to ſhow cauſe why the one ſhould not have his tenant again on payment of his rent, or the other recover the lands on default thereof.

GAUGAMELA, (anc. geog.), a village of Aturia, lying between the rivers Lycus and Tygris; famous for Alexanders's victory over Darius. It is ſaid to have been allowed to Darius Hyſtaſpes for the maintenance of a camel; and hence the name. It was not far from a more conſiderable place called *Arbela*; whence the latter gave the name to the victory. See Arbela.

GAGUE-point of a ſolid meaſure the diameter of a circle whoſe area is equal to the ſolid content of the ſame meaſure.

GAUGER, an officer who is appointed to examine all tuns, pipes, hogſheads and barrels, of wine, beer, ale, oil, honey, &c. and give them a mark of allowance, before they are ſold in any place within the extent of his office.

GAUGING. See Geometry.

Gauging-Rod, an inſtrument uſed in gauging or meaſuring the contents of any veſſel. That uſually employed is the four foot guaging-rod. It is commonly made of box, and conſiſts of four rules, each a foot long and about three-eights of an inch ſquare, joined together by three braſs joints; by which means the rod is rendered four feeet long when the four rules are quite opened, and but one foot when they are all folded together. On the firſt face of this rod, marked 4, are placed two diagonal lines; one for beer and the other for wine; by means of which the content of any common veſſel in beer or wine gallons may be readily found, by putting the rod in at the bung-hole of the veſſel till it meets the interſection of the head of the veſſel with the ſtaves oppoſite to the bung-hole. For diſtinction of this line, there is writen thereon, *beer* and *wine gallons.* On the ſecond face, 5, are a line of inches and the guage-line; which is a line expreſſing the areas of circles, whoſe diameters are the correſpondent inches in ale-gallons. At the beginning is written, *ale area.* On the third face, 6, are three ſcales of lines; the firſt, at the end of which is written *hogſhead*, is for finding how many gallons there are in a hogſhead when it is not full, lying with its axis parallel to the horizon. The ſecond line, at the end of which is written *B. L.* ſignifying a *butt lying*, is for the ſame uſe as that for the hogſhead. The third line is to find how much liquor is wanting to fill up a butt when it is ſtanding: at the end of it is written *B. S.* ſignifying a *butt ſtanding.* In the half of the fourth face of the guaging-rod, 7, there are three ſcales of lines, to find the wants in a firkin, kilderkin, and barrel lying with their areas parallel to the horizon. They are diſtinguiſhed by letters *F. K. B.* ſignifying a *firkin*, *kilderkin*, and *barrel*.

Plste
CCV.

Uſe of the diagonal lines on this rod. To find the content of a veſſel in beer or wine gallons, put the braſed end of the gauging-rod into the bung-hole of the caſk, with the diagonal lines upwards, and thruſt this braſed end to the meeting of the head and ſtaves; then with chalk make a mark at the middle of the bung hole of the veſſel, and alſo on the diagonal lines of the rod, right againſt, over one another, when the braſed end is thruſt home to the head and ſtaves: then turn the gauging-rod to the other end of the veſſel, and thruſt the braſed end home to the end as before. Laſtly, ſee if the mark made on the gauging-rod come even with the mark made on the bung-hole when the rod was thurſt to the other end; which if it be, the mark made on the diagonal lines will, on the ſame lines, ſhow the whole content of the caſk in beer or wine gallons.

If the mark made on the bung-hole be not right againſt that made on the rod when you put it the other way, then right againſt the mark made on the bung-hole make another in the diagonal lines; and the diviſion on the diagonal line between the two chalks will ſhow the veſſel's whole contents in beer or wine gallons. Thus *e. gr.* if the diagonal line of a veſſel be 28 inches four-tenths, its contents, in beer gallons will be near 51, and and in wine gallons 62

If a veſſel be open, as a half barrel, tun, or copper, and a meaſure from the middle on one ſide to the head and ſtaves be 38 inches, the diagonal line gives 122 beer gallons; half of which, *viz.* 61, is the content of the open half tub.

If you have a large veſſel, as a tun or copper, and the diagonal line taken by a long rule proves 70 inches; the content of that veſſel may be found thus: Every inch at the beginning-end of the diagonal line call ten inches. Thus ten inches becomes 100 inches; and every tenth of a gallon call 100 gallons; and every whole gallon call 1000 gallons.

Example. At 44.8 inches on the diagonal beer-line is 200 gallons; ſo that 4 inches 48 parts, now called 44 inches 8-tenths, is juſt two-tenths, of a gallon, now called 200 gallons: ſo alſo if the diagonal line be 76 inches and 7 tenths, a cloſe caſk of ſuch diagonal will hold 1000 beer-gallons; but an open caſk but half ſo much, *viz.* 500 beer-gallons.

Uſe of the Gauge-*Line.* To find the content of any cylindrical veſſel in ale-gallons; ſeek the diameter of the veſſel in inches, and juſt againſt it on the gauge-line is the quantity of ale gallons contained in one inch deep; this multiplied by the length of the cylinder will give its content in ale-gallons.

For example, ſuppoſe the length of the veſſel 32 06, and the diameter of its baſe 25 inches; to find what is the content in ale-gallons? Right againſt 25 inches on the gauge-line is one gallon and 745, of a gallon; which multiplied by 32.06 the length gives 55.9447 gallons for the content of the veſſel.

The bung diameter of a hogſhead being 25 inches, the head diameter 22 inches, and the length 32.06 inches; to find the quantity of ale-gallons contained in it?—Seek 25, the bung-diameter, on the line of inches; and right againſt it on the gauge-line you will find 1.745; take one-third of it, which is .580, and ſet it down twice: ſeek 22 inches in the head-diameter, and againſt it you will find on the gauge-line 1.356; one-third of which added to twice .580, gives 1.6096; which multiplied by the length 32.06, the product will be 51.603776, the content in ale-gallons. Note, this operation ſuppoſes, that the aforeſaid hogſhead is in the figure of the middle fruſtrum of a ſpheroid.

The uſe of the lines on the two other faces of the rod is very eaſy; you need only put it down-right into the bung-hole; (if the veſſel you deſire to know the quantity of ale-gallons contained therein be lying) to the oppoſite ſtaves; and then where the ſurface of the liquor cuts any one of the lines appropriated to that veſſel, will be the number of gallons contained in that veſſel.

GAUL, the name given by the Romans to the country that now forms the kingdom of France.—The original inhabitants were deſcended from the Celtes or Gomerians by whom the greateſt part of Europe was peopled; the name of *Galli* or *Gauls*, being probably given them long after their ſettlement in that country. See Gallia.

The ancient hiſtory of the Gauls is entirely wrapped up in obſcurity and darkneſs; all we know concerning them for a long time is, that they multiplied ſo faſt, that their country being unable to contain them, they poured forth in vaſt multitudes into other countries, which they generally ſubdued, and ſettled themſelves in. It often happened, however, that theſe colonies were ſo moleſted by their neighbours, that they were obliged to ſend for aſſiſtance to their native country. This was always very eaſily obtained. The Gauls were, upon every occaſion, ready to ſend forth great numbers of new adventurers; and as theſe ſpread deſolation wherever they came, the very name of *Gauls* proved terrible to moſt of the neighbouring nations.—The earlieſt excurſion of theſe people, of which we have any diſtinct account, was into Italy, under a famed leader, named *Belloveſus*, about 622 years before Chriſt. He croſſed the Rhone and the Alps, till then unattempted; defeated the Hetrurians; and ſeized upon that part of their country, ſince known by the name of *Lombardy* and *Piedmont.*—The ſecond grand expedition was made by the Cœnomani, a people dwelling between the rivers Seine and Loire, under a general named *Elitonis.* They ſettled in thoſe parts of Italy now known by the names of *Breſciano, Cremoneſe, Mantuan, Carniola,* and *Venetian.*—In a third excurſion, two other Gauliſh nations ſettled on both ſides of the river Po; and in a fourth, the Boii and Lingones ſettled in the country between Ravenna and Bologna. The time of theſe three laſt expeditions is uncertain.

1
Account of the Gauliſh excurſions into Italy.

The fifth expedition of the Gauls was more remarkable than any of the former, and happened about 200 years after that of Belloveſus. The Senones, ſettled between Paris and Meux, were invited into Italy by an Hetrurian lord, and ſettled themſelves in Umbria. Brennus their king laid ſiege to Cluſium, a city in alliance with Rome; and this produced a war with the Romans, in which the latter were at firſt defeated, and their city taken and burnt; but at length the whole army was cut off by Camillus, inſomuch that not a ſingle perſon eſcaped.

Some other expeditions the Gauls undertook againſt the Romans: in which, though they always proved unſucceſsful, by reaſon of their want of military diſcipline; yet their fierceneſs and courage made them ſo formidable to the republic, that, on the firſt news of their march, extraordinary levies of troops were made, ſacrifices and public ſupplications offered to the gods, and the law which granted an immunity from military ſervice to prieſts and old men, was, for the time, aboliſhed.

2
Expedition againſt the Greeks.

Againſt the Greeks, the expeditions of the Gauls were very little more ſucceſsful than againſt the Romans. The firſt of theſe we hear of was about 279 years before Chriſt, in the year after Pyrrhus had invaded Italy. At this time, the Gauls finding themſelves greatly overſtocked at home, ſent out three great colonies to conquer new countries for themſelves. One of theſe armies was commanded by *Brennus*, another by *Cerethrius*, and the third by *Belgius*. The firſt entered Panonia, or Hungary; the ſecond Thrace; and the third marched into Illyricum and Macedonia. Here Belgius at firſt met with great ſucceſs; and enriched himſelf by plunder to ſuch a degree, that Brennus envying him, reſolved to enter the ſame countries, in order to ſhare the ſpoil. In a ſhort time, however, Belgius met with ſuch a total defeat, that his army was almoſt entirely deſtroyed: upon which Brennus haſtened to the ſame place. His army at firſt conſiſted of 150,000 foot and 15,000 horſe: but two of his principal officers revolted, and carried off 20,000 men, with whom they marched into Thrace; where having joined Cerethrius, they ſeized on Byzantium and the weſtern coaſt of Propontis, making the adjacent parts tributary to them.—To retrieve this loſs, Brennus ſent for freſh ſupplies from Gaul; and having increaſed his army to 150,000 foot, and upwards of 60,000 horſe, he entered Macedonia, defeated the general who oppoſed him, and ravaged the whole country. He next marched towards the ſtraits of Thermopylæ, with a deſign to invade Greece; but was ſtopped by the forces ſent to defend that paſs againſt him. He paſſed the mountains, however, as Xerxes had formerly done; upon which the guards retired, to avoid being ſurrounded. Brennus then, having ordered Acichorius, the next to him in command, to follow at a diſtance with part of his army, marched with the bulk of the forces to Delphi, in order to plunder the rich temple there. This enterpriſe proved exceedingly unfortunate: a great number of his men were deſtroyed by

3 Miſerable fate of their army.

by a dreadful ſtorm of hail, thunder, and lightening; another part of his army was deſtroyed by an earthquake; and the remainder, ſome how or other, imagining themſelves attacked by the enemy, fought againſt each other the whole night, ſo that in the morning ſcarce one-half of them remained. The Greek forces then poured in upon them from all parts; and that in ſuch numbers, that though Acichorius came up in due time with his forces, Brennus found himſelf unable to make head againſt the Greeks, and was defeated with great ſlaughter. He himſelf was deſperately wounded; and ſo diſheartened by his miſfortune, that, having aſſembled all his chiefs, he adviſed them to kill all the wounded and diſabled, and to make the beſt retreat they could; after which he put an end to his own life. On this occaſion, it is ſaid that 20,000 of theſe unhappy people were executed by their own countrymen. Acichorius then ſet out with the remainder for Gaul; but by being obliged to march through the country of their enemies, the calamities they met with by the way were ſo grievous, that not one of them reached their own country. A juſt judgement, ſay the Greek and Roman authors, for their ſacrilegious intentions againſt Delphi.

4 Gaul invaded by the Romans.

The Romans having often felt the effects of the Gauliſh ferocity and courage, thought proper at laſt, in order to humble them, to invade their country. Their firſt ſucceſsful attempt was about 118 years before Chriſt, under the command of Quintus Marcius, ſurnamed *Rex*. He opened a way betwixt the Alps and the Pyrenees, which laid the foundation for conquering the whole country. This was a work of immenſe labour of itſelf, and rendered ſtill more difficult by the oppoſition of the Gauls, eſpecially thoſe called the Stæni, who lived at the foot of the Alps. Theſe people finding themſelves overpowered by the conſular army, ſet fire to their houſes, killed their wives and children, and then threw themſelves into the flames. After this Marcius built the city of Narbonne, which became the capital of a province. His ſucceſſor Scaurus alſo conquered ſome Gauliſh nations; and in order to facilitate the ſending troops from Italy into that country, he made ſeveral excellent roads between them, which before were almoſt impaſſable. Theſe ſucceſſes gave riſe to the invaſion of the Cimbri and Teutones; an account of whoſe unfortunate expedition is given under the articles CIMBRI, ROME, TEUTONES, &c.

5 Surpriſing ſucceſs of Julius Cæſar.

From this time, the Gauls ceaſed to be formidable to the Romans, and even ſeem to have been for ſome time on good terms with them. At laſt, however, the Helvetii kindled a war with the republic, which brought Cæſar over the Alps, and ended in the total ſubjection of the country. Orgetorix was the firſt cauſe of it; who had engaged a vaſt number of his countrymen to burn their towns and villages, and to go in ſearch of new conqueſts. Julius Cæſar, to whoſe lot the whole country of Gaul had fallen, made ſuch haſte to come and ſuppreſs them, that he was got to the Rhone in eight days; broke down the bridge of Geneva, and, in a few days more, finiſhed the famed wall between that city and mount Jura, now St Claude, which extended ſeventeen miles in length, was ſixteen feet high, fortified with towers and caſtles at proper diſtances, and a ditch that run the whole length of it. If his own account of it may be relied upon, he did not ſet out till the beginning of April; and yet this huge work was finiſhed by the ides or 13th of the month: ſo that, ſubtracting the eight days he was a-coming, it muſt have been all done in about five days; a prodigious work, conſidering he had but one legion there, or even though the whole country had given him aſſiſtance. Whilſt this was doing, and the reinforcements he wanted were coming, he amuſed the Helvetii, who had ſent to demand a paſſage through the country of the Allobroges, till he had got his reinforcements; and then flatly refuſed it to them: whereupon a dreadful battle enſued; in which they loſt one hundred and thirty thouſand men, in ſpite of all their valour; beſides a number of priſoners, among whom was the wife and daughter of Orgetorix, the leader of this unfortunate expedition. The reſt ſubmitted, and begged they might be permitted to go and ſettle among the Ædui, from whom they originally ſprung; and, at the requeſt of theſe laſt, were permitted to go.

6 A general confederacy againſt him.

7 The Gauls defeated with great ſlaughter.

The Gauls were conſtantly in a ſtate of variance with one another; and Cæſar, who knew how to make the moſt of theſe inteſtine broils, ſoon became the protector of the oppreſſed, a terror to the oppreſſor, and the umpire of all their contentions. Among thoſe who applied to him for help, were his allies the Ædui; againſt whom Arioviſtus, king of the Germans, joined with the Averni, who inhabited the banks of the Loire, had taken the country of the Sequani from them, and obliged them to ſend hoſtages to him. Cæſar, forthwith ſent to demand the reſtitution of both, and, in an interview which he ſoon after obtained of that haughty and treacherous prince, was like to have fallen a ſacrifice to his perfidy; upon which he bent his whole power againſt him, forced him out of his ſtrong entrenchments, and gave him a total overthrow. Arioviſtus eſcaped with difficulty over the Rhine; but his two wives, and a daughter, with a great number of Germans of diſtinction, fell into the conqueror's hand. Cæſar, after this ſignal victory, put his army into winter-quarters, whilſt he went over the Alps to make the neceſſary preparations for the next campaign. By this time all the Belgæ in general were ſo terrified at his ſucceſs, that they entered into a confederacy againſt the Romans as their common enemy. Of this, Labienus, who had been left in Gaul, ſent Cæſar notice; upon which he immediately left Rome, and made ſuch diſpatch, that he arrived on their confines in about fifteen days. On his arrival the Remi ſubmitted to him; but the reſt, appointing Galba, king of the Sueſſones, general of all their forces, which amounted to one hundred and fifty thouſand men, marched directly againſt him. Cæſar, who had ſeized on the bridge of the Axona, now Aiſne, led his light horſe and infantry over it; and whilſt the others were encumbered in croſſing the river, made ſuch a terrible ſlaughter of them, that the river was filled with their dead, inſomuch that their bodies ſerved for a bridge to thoſe who eſcaped. This new victory ſtruck ſuch terror into the reſt, that they diſperſed themſelves; immediately after which the Sueſſones, Bellovaci, Ambiones, and ſome others, ſubmitted to him. The Nervii, indeed, joined with the Atrebates and Veromandui againſt them; and having firſt ſecured their wives and children, made a vigorous reſiſtance for ſome time;

but were at length defeated, and the greateſt part of them ſlain. The reſt, with their wives and old men, ſurrendered themſelves, and were allowed to live in their own cities and towns as formerly. The Aduatici were next ſubdued; and, for their treachery to the conqueror, were ſold for ſlaves, to the number of fifty thouſand. Young Craſſus, the ſon of the triumvir, ſubdued likewiſe ſeven other nations, and took poſſeſſion of their cities; which not only completed the conqueſt of the Belgæ, but brought ſeveral nations from beyond the Rhine to ſummit to the conqueror. The Veneti, or ancient inhabitants of Vannes in Brittany, who had been likewiſe obliged to ſend hoſtages to the conqueror, were, in the mean time, making great preparations by ſea and land to recover their liberty. Cæſar, then in Illyricum, was forced to equip a fleet on the Loire; and having given the command of it to Brutus, went and defeated them by land, as Brutus did by ſea; and having put their chief men to death, ſold the reſt for ſlaves. The Unelli, with Veridorix their chief, together with the Lexovii and Aulercii, were about the ſame time ſubdued by Sabinus, and the Aquitani by Craſſus, with the loſs of thirty thouſand men. There remained nothing but the countries of the Morini and Menapii to be conquered of all Gaul. Cæſar marched himſelf again them: but he found them ſo well intrenched in their inacceſſible fortreſſes, that he contented himſelf with burning and ravaging their country; and having put his troops into winter-quarters, again paſſed over the Alps, to have a more watchful eye on ſome of his rivals there. He was, however, ſoon after obliged to come to defend his Gauliſh conqueſts againſt ſome nations of the Germans, who were coming to ſettle there, to the number of four hundred thouſand. Theſe he totally defeated, and then reſolved to carry his conquering arms into Germany: but for an account of his exploits there, ſee the article GERMANY.

8 The Gauls revolt, but are ſubdued.

Upon his return into Gaul, he found it labouring under a great famine, which had cauſed a kind of univerſal revolt. Cotta and Sabinus, who were left in the country of the Eubrones, now Liege, were betrayed into an ambuſh by Ambiorix, one of the Gauliſh chiefs, and had moſt of their men cut off. The Aduatici had fallen upon Q. Cicero, who was left there with one legion, and had reduced him to great ſtraits: at the ſame time Labienus, with his legion, was attacked by Indutiomarus, at the head of Rheni and Senones; but had better luck than the reſt, and, by one bold ſally upon them, put them to flight, and killed their general. Cæſar acquired no ſmall credit by quelling all theſe revolts; but each victory loſt the lives of ſo many of his troops, that he was forced to have recourſe to Pompey for a freſh ſupply, who readily granted him two of his own legions to ſecure his Gauliſh conqueſts.

9 A ſecond revolt.

But it was not long before the Gauls, ever reſtleſs under a foreign yoke, raiſed up a new revolt, and obliged him to return thither. His fear leſt Pompey ſhould gain the affections of the Roman people, had obliged him to ſtrip the Gauls of their gold and ſilver, to bribe them over to his intereſt; and this gave no ſmall handle to thoſe frequent revolts which happened during his abſence. He quickly, however, reduced the Nervii, Aduatici, Menapii, and Treviri; the laſt of whom had raiſed the revolt, under the command of Ambiorix: but he found the flame ſpread much farther, even to the greateſt part of the Gauls, who had choſen Vercingetorix their generaliſſimo. Cæſar was forced to leave Inſubria, whither he had retired to watch the motions of Pompey, and, in the midſt of winter and ſnow, to repaſs the Alps into the province of Narbonne. Here he gathered his ſcattered troops with all poſſible ſpeed; aud, in ſpite of the hard weather, beſieged and took Noviodunum, now Noyons; and defeated Vercingetorix, who was come to the relief of that place. He next took the city of Avaricum, now Bourges, one of the ſtrongeſt in Gaul, and which had a garriſon of forty thouſand men; of whom he made ſuch a dreadful ſlaughter, that hardly eight hundred eſcaped. Whilſt he was beſieging Gergovia, the capital of the Arverni, he was informed that the Nitiobriges, or Agenois, were in arms; and that the Ædui were ſending to Vercingetorix ten thouſand men, which they were to have ſent to reinforce Cæſar. Upon this news, he left Fabius to carry on the ſiege, and marched againſt Ædui. Theſe, upon his approach, ſubmitted, in appearance, and were pardoned; but ſoon after that whole nation roſe up in arms, and murdered all the Italian troops in their capital. Cæſar, at this, was in great ſtraits what meaſures to take; but reſolved at length to raiſe the ſiege of Gergovia, and at once attack the enemy's camp, which he did with ſome ſucceſs; but when he thought to have gone to Noviodunum, or Noyons, where his baggage, military cheſt, &c. were left, he heard that the Ædui had carried it off, and burnt the place. Labienus, juſtly thinking that Cæſar would want his aſſiſtance in the condition he now was, went to join him, and in his way defeated a Gauliſh general named *Camulogeno*, who came to oppoſe his march: but this did not hinder the revolt from ſpreading itſelf all over the Celtic Gaul, whether Vercingetorix had ſent for freſh ſupplies, and, in the mean time, attacked Cæſar; but was defeated, and forced to retire to Aleſia, a ſtrong place, now Aliſe in Burgundy, as is ſuppoſed. Hither Cæſar haſtened, and beſieged him; and, having drawn a double circumvallation, with a deſign to ſtarve him in it, as he was likely to have done, upon that account refuſed all offers of a ſurrender from him. At length, the long expected reinforcement came, conſiſting of 160,000 men, under four generals: theſe made ſeveral fruitleſs attacks on Cæſar's trenches; but were defeated in three ſeveral battles, which at length obliged Vercingetorix to ſurrrender at diſcretion. Cæſar uſed all his priſoners with great ſeverity, except the Ædui and Arverni, by whoſe means he hoped to gain their nations, which were the moſt potent of the Celtic Gaul; nor was he diſappointed; for both of them ſubmittted to him, and the former received him into the capital, where he ſpent the winter, after he put his army into winter-quarters. This campaign as it proved one of the hardeſt he ever had, ſo he gained more glory by it than any Roman general had done before: yet could not at all by this procure from the ſervile ſenate, now wholly dedicated to his rival, a prolongation of his proconſulſhip; upon which he is reported to have laid his hand upon his ſword, and ſaid, that that ſhould do it.

10 They are again ſubdued.

He was as good as his word; and the Gauls, upon their former ill ſucceſs, reſolving to have as many ſeparate armies as provinces, in order to embarraſs him the more, Cæſar, and his generals Labienus and Fabius were forced to fight them one after another; which they did however, with ſuch ſucceſs, that, notwithſtanding the hardneſs of the ſeaſon, they ſubdued the Bituriges, Carnuti, Rhemi, and Bellovaci, with their general Correus, by which he at once quieted all the Belgic provinces bordering on Celtic Gaul. The next who followed were the Treviri, the Eburones, and the Andes, under their general Dunmarus. The laſt place which held out againſt him was Uxellodunum; which was defended by the two laſt acting generals of the Gauls. Drapes, the Senonian, and Luterius the Cadurcean. The place being ſtrong, and well garriſoned, Cæſar was obliged to march thither, from the fartheſt part of Belgic Gaul; and ſoon after reduced it, for want of water. Here again he cauſed the right hands of all that were fit to bear arms to be cut off, to deter the reſt from revolting afreſh. Thus was the conqueſt of Gaul finiſhed from the Alps and Pyrenees to the Rhine, all which vaſt tract was now reduced to a Roman province under the government of a prætor. During his ſeveral expeditions into Gaul, Cæſar is ſaid to have taken 800 cities; to have ſubdued 300 different nations; and to have defeated in ſeveral battles, three millions of men, of whom one million were killed, and another taken priſoners.—The hiſtory of the country, from the time of its conqueſt by the Romans to the preſent, is given under the article ROME and FRANCE.

11 Gaul reduced to a Roman province.

12 Character, &c. of the ancient Gauls.

The Gauls anciently were divided into a great number of different nations, which were continually at war with one another, and at variance among themſelves. Cæſar tells us, that not only all their cities, cantons, and diſtricts, but even almoſt all families, were divided and torn by factions; and thus undoubtedly facilitated the conqueſt of the whole. The general character of all theſe people was an exceſſive ferocity and love of liberty. This laſt they carried to ſuch an extreme, that either on the appearance of ſervitude, or incapacity of action through old age, wounds, or chronic diſeaſes, they put an end to their own lives, or prevailed upon their friends to kill them. In cities, when they found themſelves ſo ſtraitly beſieged that they could hold out no longer, inſtead of thinking how to obtain honourable terms of capitulation, their chief care very often was to put their wives and children to death, and then to kill one another, to avoid being led into ſlavery. Their exceſſive love of liberty and contempt of death, according to Strabo, very much facilitated their conqueſt by Cæſar; for pouring their numerous forces upon ſuch an experienced enemy as Cæſar, their want of conduct very ſoon proved the ruin of the whole.

The chief diverſion of the Gauls was hunting; and indeed, conſidering the vaſt foreſts with which their country abounded, and the multitude of wild beaſts which lodged in them, they were under an abſolute neceſſity to hunt and deſtroy them, to prevent the country from being rendered totally uninhabitable. Beſides this, however, they had alſo their hippodromes, horſe and chariot races, tilts and tournaments; at all of which the bards aſſiſted with their poems, ſongs, and muſical inſtruments.—For an account of their religion, ſee the article DRUID.

The Gauls were exceſſively fond of feaſting, in which they were very profuſe; as like all other northern nations, they were great lovers of good eating and drinking. Their chief liquors were beer and wine. Their tables were very low. They ate but little bread, which was baked flat and hard, and eaſily broken in pieces: but devoured a great deal of fleſh, boiled, roaſted, or broiled; and this they did in a very ſlovenly manner, holding the piece in their hands, and tearing it with their teeth. What they could not part by this way, they cut with a little knife which hung at their girdle. When the company was numerous, the *Coryphee*, or chief of the feaſt, who was either one of the richeſt, or nobleſt, or braveſt, ſat in the middle, with the maſter of the houſe by his ſide; the reſt took their places next according to their rank, having their ſervants holding their ſhields behind them. Theſe feaſts ſeldom ended without bloodſhed, but if by chance the feaſt proved a peaceable one, it was generally accompanied not only with muſic and ſongs, but likewiſe with dances, in which the dancers were armed cap-a-pee, and beat time with their ſwords upon their ſhields. On certain feſtivals they were wont to dreſs themſelves in the ſkins of beaſts, and in that attire accompany the proceſſions in honour of their deities or heroes. Others dreſſed themſelves in maſquerade habits, ſome of them very indecent, and played ſeveral antic and immodeſt tricks. This laſt cuſtom continued long after their converſion to Chriſtianity.

GAULANITIS, or GAULONITIS, (Joſephus); (anc. geog.) according to the different manner of writing the capital, *Galon* or *Gaulon*; the extreme part of Baſhan to the ſouth, and bordering on the tribe of Gad. It was divided into the Superior, which to the eaſt extended to Arabia; and into the Inferior, which lay on the lake of Geneſareth, (Joſephus).

GAULON, or GOLAN, the capital of the Gaulanitis Superior; a Levitical city and place of refuge, (Moſes, Joſhua.)

GAULOS, (anc. geog.) a ſmall iſland of Sicily, in the African ſea, adjoining to Melite or Malta; with commodious harbours; a colony of Phœnicians, with a cognominal town. Gaulonitae, the people, (Inſcription). Now called *Gozo*, five miles to the weſt of Malta.

GAULTHERIA, in botany: A genus of the monogynia order, belonging to the decandria claſs of plants; and in the natural method ranking under the 18th order, *Bicornes*. The exterior calyx is diphyllous, the interior quinquefid; the corolla ovate; the nectarium conſiſts of ten ſubulated points. The capſule is quinquelocular, covered with the interior calyx formed in the ſhape of a berry.

GAUNT-BELLIED, in the manege, is ſaid of a horſe whoſe belly ſhrinks up towards his flanks.

GAUNTLET. See GANTLET.

GAUNTLOPE, pronounced *Gauntlet*, a military puniſhment for felony, or ſome other heinous offence.

In veſſels of war, it is executed in the following manner. The whole ſhip's crew is diſpoſed in two rows, ſtanding face to face on both ſides of the deck, ſo as to form a line whereby to go *forward* on one ſide, and return *aft* on the other; each perſon being furniſhed with a ſmall twiſted chord, called a *knittle*, having two or three knots upon it. The delinquent is then ſtripped naked above the waiſt, and ordered to paſs forward between the two rows of men, and aft on the other ſide, a certain number of times, rarely exceeding three; during which every perſon gives him a ſtripe as he runs along. In his paſſage through this painful ordeal, he is ſometimes tripped up, and very ſeverely handled while incapable of proceeding. This puniſhment, which is called *running the gauntlet*, is ſeldom inflicted, except for ſuch crimes as will naturally excite a general antipathy among the ſea-men; as, on ſome occaſions, the culprit would paſs without receiving a ſingle blow, particularly in caſes of mutiny and ſedition, to the puniſhment of which the ſailors ſeem to have a conſtitutional averſion.

In the land-ſervice, when a ſoldier is ſentenced to run the gauntlope, the regiment is drawn out in two ranks facing each other; each ſoldier, having a ſwitch in his hand, laſhes the criminal as he runs along naked from the waiſt upwards. While he runs, the drums beat at each end of the ranks. Sometimes he runs three, five, or ſeven times, according to the nature of the offence. The major is on horſeback, and takes care that each ſoldier does his duty.

GAVIES, or GAURS. See GABRES.

GAVOTTA, or GAVOTTE, is a kind of dance, the air of which has two briſk and lively ſtrains in common time, each of which ſtrains is twice played over. The firſt has uſually four or eight bars; and the ſecond contains eight, twelve, or more. The firſt begins with a minim, or two crotchets, or notes of equal value, and the hand riſing; and ends with the fall of the hand upon the dominant or mediant of the mode, but never upon the final, unleſs it be a rondeau: and the laſt begins with the riſe of the hand, and ends with the fall upon the final of the mode.

Tempi di GAVOTTA, is when only the time or movement of a gavotte is imitated, without any regard to the meaſure or number of bars or ſtrains.—Little airs are often found in ſonatas, which have this phraſe to regulate their motions.

GAURA, in botany: A genus of the monogynia order, belonging to the octandria claſs of plants; and in the natural method ranking under the 17th order, *Calycanthemæ*. The calyx is quadrifid and tubular; the corolla pentapetalous, with the petals riſing upwards. The nut is inferior, monoſpermous, and quadrangular.

GAUSE, or GAWSE, in commerce, a very thin, ſlight, tranſparent kind of ſtuff, woven ſometimes of ſilk, and ſometimes only of thread.—To warp the ſilk for making of gauſe, they uſe a peculiar kind of mill, upon which the ſilk is wound: this mill is a wooden machine about ſix feet high, having an axis perpendicularly placed in the middle thereof, with ſix large wings, on which the ſilk is wound from off the bobbins by the axis turning round. When all the ſilk is on the mill, they uſe another inſtrument to wind it off again on two beams: this done, the ſilk is paſſed through as many little beads as there are threads of ſilk; and thus rolled on another beam to ſupply the loom.

The gauſe-loom is much like that of the common weavers, though it has ſeveral appendages peculiar thereto. See LOOM.

There are figured gauſes; ſome with flowers of gold and ſilver, on a ſilk ground: theſe laſt are chiefly brought from China.

GAY (John), a celebrated Engliſh poet, deſcended from an ancient family in Devonſhire, was born at Exeter, and received his education at the free ſchool of Barnſtaple in that county, under the care of Mr William Rayner.—He was bred a mercer in the Strand; but having a ſmall fortune independent of buſineſs, and conſidering the attendance on a ſhop as a degradation of thoſe talents which he found himſelf poſſeſſed of, he quitted that occupation, and applied himſelf to other views, and to the indulgence of his inclination for the muſes. In 1712 we find him ſecretary, or rather domeſtic ſteward, to the ducheſs of Monmouth, in which ſtation he continued till the beginning of the year 1714; at which time he accompanied the earl of Clarendon to Hanover, whither that nobleman was diſpatched by Queen Anne. In the latter end of the ſame year, in conſequence of the queen's death, he returned to England, where he lived in the higheſt eſtimation and intimacy of friendſhip with many perſons of the firſt diſtinction both in rank and abilities.—He was even particularly taken notice of by Queen Caroline, then princeſs of Wales, to whom he had the honour of reading in manuſcript his tragedy of the *Captives*; and in 1726 dedicated his *Fables*, by permiſſion, to the Duke of Cumberland.—From this countenance ſhown to him, and numberleſs promiſes made him of preferment, it was reaſonable to ſuppoſe, that he would have been genteely provided for in ſome office ſuitable to his inclination and abilities. Inſtead of which, in 1727, he was offered the place of gentleman-uſher to one of the youngeſt princeſſes; an office which, as he looked on it as rather an indignity to a man whoſe talents might have been ſo much better employed, he thought proper to refuſe; and ſome pretty warm remonſtrances were made on the occaſion by his ſincere friends and zealous patrons the duke and ducheſs of Queenſberry, which terminated in thoſe two noble perſonages withdrawing from court in diſguſt. Mr Gay's dependencies on the promiſes of the great, and the diſappoinments he met with, he has figuratively deſcribed in his fable of the *Hare with many friends*. However, the very extraordinary ſucceſs he met with from public encouragement made an ample amends, both with reſpect to ſatisfaction and emolument, for thoſe private diſappointments.—For, in the ſeaſon of 1727-8, appeared his *Beggar's Opera*; the vaſt ſucceſs of which was not only unprecedented, but almoſt incredible.—It had an uninterrupted run in London of 63 nights in the firſt ſeaſon, and was renewed in the enſuing one with equal approbation. It ſpread into all the great towns of England; was played in many places to the 30th and 40th time, and at Bath and Briſtol 50; made its progreſs into Wales, Scotland, and Ireland, in which laſt place it was acted for 24 ſucceſſive nights; and laſt of all it was performed at Minorca. Nor was the fame of it confined to the reading and repreſentation alone, for the card-table and drawing-room ſhared with the theatre and cloſet in this reſpect; the ladies carried about the favourite ſongs of it engraven upon their fan-mounts, and ſcreens and other pieces of furniture were decorated with the ſame. In ſhort, the ſatire of this piece was ſo ſtriking, ſo apparent, and ſo perfectly adapted to the taſte of all degrees of people, that it overthrew the Italian opera, that Dagon of the nobility and gentry, which had ſo long ſeduced them to idolatry, and which Dennis, by the labours and outcries of a whole life, and many other writers by the force of reaſon and reflection, had in vain endeavoured to drive from the throne of public taſte. The profits of this piece were ſo very great, both to the author and Mr Rich the manager, that it gave riſe to a quibble, which became frequent in the mouths of many, viz. *That it had made* Rich gay, *and* Gay rich; and it has been aſſerted, that the author's own advantages from it were not leſs than 2000l. In conſequence of this ſucceſs, Mr Gay was induced to write a ſecond part to it, which he intitled *Polly*. But the diſguſt ſubſiſting between him and the court, together with the miſrepreſentations made of him as having been the author of ſome diſaffected libels and ſeditious pamphlets, occaſioned a prohibition and ſuppreſſion of it to be ſent from the lord chamberlain, at the very time when every thing was in readineſs for the rehearſal of it. A very conſiderable ſum, however, accrued to him from the publication of it afterwards in quarto.—Mr Gay wrote ſeveral other pieces in the dramatic way, and many very valuable ones in verſe. Among the latter, his *Trivia*, or the *Art of walking the ſtreets of London*, tho' his firſt poetical attempt, is far from being the leaſt conſiderable, and is what recommended him to the eſteem and friendſhip of Mr Pope: but as, among his dramatic works, his *Beggars Opera* did at firſt, and perhaps ever will, ſtand as an unrivalled maſter-piece, ſo, among his poetical works, his *Fables* hold the ſame rank of eſtimation, the latter having been almoſt as univerſally read as the former was repreſented, and both equally admired. Mr Gay's diſpoſition was ſweet and affable, his temper generous, and his converſation agreeable and entertaing. But he had one foible, too frequently incident to men of great literary abilites, and which ſubjected him at times to inconveniences which otherwiſe he needed not to have experienced, viz. an exceſs of indolence, without any knowledge of economy. So that, though his emoluments were, at ſome periods of his life, very conſiderable, he was at others greatly ſtraitened in his circumſtances; nor could he prevail on himſelf to follow the advice of his friend Dean Swift, whom we find in many of his letters endeavouring to perſuade him to the purchaſing of an annuity, as a reſerve for the exigencies that might attend on old age.—Mr Gay choſe rather to throw himſelf on patronage, than ſecure to himſelf an independent competency by the means pointed out to him; ſo that, after having undergone many viciſſitudes of fortune, and being for ſome time chiefly ſupported by the liberality of the duke and ducheſs of Queenſberry, he died at their houſe in Burlington-gardens, in December 1732. He was interred in Weſtminſter-abbey, and a monument erected to his memory, at the expence of his aforementioned noble benefactors, with an inſcription expreſſive of their regards and his own deſerts, and an epitaph in verſe by Mr Pope.

GAZA (Theodore), a famous Greek in the 15th century, was born in 1398. His country being invaded by the Turks, he retired into Italy; where he at firſt ſupported himſelf by tranſcribing ancient authors, an employment the learned had frequent recourſe to before the invention of printing. His uncommon parts and learning ſoon recommended him to public notice; and particularly to cardinal Beſſarion, who procured him a benefice in Calabria. He was one of thoſe to whom the revival of polite literature in Italy was principally owing. He tranſlated from the Greek into Latin, Ariſtotle's Hiſtory of Animals, Theophraſtus on Plants, and Hippocrates's Aphoriſms; and put into Greek, Scipio's Dream, and Cicero's Treatiſe on Old Age. He wrote ſeveral other works in Greek and Latin; and died at Rome in 1475.

GAZA, (anc. geog.), a principal city and one of the five ſatrapies of the Philiſtines. It was ſituated about 100 ſtadia from the Mediterranean, on an artificial mount, and ſtrongly walled round. It was deſtroyed by Alexander the Great, and afterwards by Antiochus. In the time of the Maccabees it was a ſtrong and flouriſhing city; but was deſtroyed a third time by Alexander Jannæus. At preſent it has a miſerable appearance. The buildings are mean, both as to the form and matter. Some remains of its ancient grandeur appear in the handſome pillars of Parian marble which ſupport ſome of the roofs; while others are diſpoſed of here and there, in different parts of almoſt every beggarly cottage. On the top of the hill, at the north eaſt corner of the town, are the ruins of large arches ſunk low into the earth, and other foundations of a ſtately building, from whence ſome of the baſhaws have carried off marble pillars of an incredible ſize. The caſtle is a contemptible ſtructure, and the port is ruined. E. Long. 34. 55. N. Lat. 31. 28.

GAZE-HOUND, or *Gaſt-hound*, one that makes more uſe of his ſight than of his noſe. Such dogs are much uſed in the north of England: they are fitter in an open champaign country than in buſhy and woody places. If at any time a well-taught gaze-hound takes a wrong way, he will return upon a ſignal and begin the chace afreſh. He is alſo excellent at ſpying out the fatteſt of a herd; and having ſeparated it from the reſt, will never give over the purſuit till he has worried it to death.

GAZEL, in zoology, a ſpecies of CAPRA.

GAZETTE, a newſpaper, or printed account of the tranſactions of all the countries in the known world in a looſe ſheet or half-ſheet. This name is in England confined to that paper of news publiſhed by authority. The word is derived from *gazetta*, a Venetian coin, which was the uſual price of the firſt newſpaper printed there, and which was afterwards given to the paper itſelf.

The firſt gazette in England was publiſhed at Oxford, the court being there, in a folio half-ſheet, Nov. 7. 1665. On the removal of the court to London, the title was changed to the *London Gazette*. The Oxford gazette was publiſhed on Tueſdays, the London on Saturdays: and theſe have continued to be the days of publication ever ſince.

GAZNA, a city of Aſia, once much celebrated, and the capital of a very extenſive empire; but which is now either entirely ruined, or become of ſo little conſideration, that it is not taken notice of in our books of geography.—This city was anciently an empory and fortreſs of Sableſtan, not far from the confines of India. During the vaſt and rapid conqueſts of the Arabs, all this country had been reduced under their ſubjection. On the decline of the power of the khalifs, however, the vaſt empire eſtabliſhed by Mahomet and his ſucceſſors was divided into a number of independent principalities, moſt of which were but of ſhort duration. In the year of the Hegira 384, anſwering to the 994th of the Chriſtian era, the city of Gazna, with ſome part of the adjacent country, was governed by Mahmud Gazni; who became a great conqueror, and reduced under his ſubjection a conſiderable part of India, and moſt of Perſia.

This empire continued in the family of Mahmud Gazni for upwards of 200 years. None of his ſucceſſors, however, were poſſeſſed of his abilities; and therefore the extent of the empire, inſtead of increaſing, was very conſiderably diminiſhed ſoon after Mahmud's death. The Seljuks made themſelves maſters of Khoraſan, and could not be driven out; the greateſt part of the Perſian dominions alſo fell off; and in the 547th year of the Hegira, the race of Gazni ſultans were entirely ſet aſide by one Gauri, who conquered Khoſru Shah the reigning prince, and beſtowed his dominions on his own nephew Gayathoddin Mohammed. Theſe new ſultans proved greater conquerors than the former, and extended their dominions farther than even Mahmud Gazni himſelf had done. They did not, however, long enjoy the ſovereignty of Gazna; for in 1218, Jenghiz Khan having conquered the greateſt part of China and almoſt all Tartary, began to turn his arms weſtward; and ſet out againſt the ſultan of Gazna at the head of 700,000 men.

To oppoſe this formidable army, Mohammed, the reigning ſultan, could muſter only 400,000 men; and, in the firſt battle, 160,000 of his troops are ſaid to have periſhed. After this victory, Jenghiz Khan advanced; Mohammed not daring to riſk a ſecond battle, the loſs of which would have been attended with the entire ruin of his kingdom. He therefore diſtributed his army among the ſtrongeſt fortified towns he had in his dominions; all of which Jenghiz Khan took one after another. The rapid progreſs of his conqueſts, indeed, almoſt exceeds belief. In 1219 and 1220, he had reduced Zarnuk, Nur, Bokhara, Otrar, Saganak, Uzkant, Alſhaſh, Jund Tonkat, Khojend, and Samarcand.—Mohammed, in the mean time, fled firſt to Bokhara; but on the approach of Jenghiz Khan's army, quitted that place, and fled to Samarcand. When this laſt city was alſo in danger of being inveſted, the ſultan did not think proper to truſt himſelf in it more than in the other, though it was garriſoned by 110,000 of his braveſt troops; and therefore fled through byways into the province of Ghilan in Perſia, where he took refuge in a ſtrong fortreſs called *Eſtabad*. But being alſo found out in this retreat, he fled to an iſland in the Caſpian ſea called *Abiſkum*; where he ended his days, leaving his empire, ſuch as it was, to his ſon Jaloloddin.

The new ſultan was a man of great bravery and experience in war; but nothing was able to ſtop the progreſs of the Moguls. In 1220 and 1221, they made themſelves maſters of all the kingdoms of Karazim and Khoraſan, committing every where ſuch maſſacres as were never heard of before or ſince that time. In the mean time Jaloloddin aſſembled his forces with the utmoſt diligence, and defeated two detachments of the Mogul army. This happened while Jenghiz Khan was beſieging Bamiyan; but anſwered little other purpoſe, than ſerving to bring upon that city the terrible deſtruction, of which an account is given under the article BAMIYAN. Immediately after the reduction of that city, Jenghiz Khan marched towards Gazna; which was very ſtrongly fortified, and where he expected to have found Jaloloddin. But he had left the place 15 days before; and, as Jenghiz Khan's army was much reduced, he might perhaps have ſtood his ground, had it not been for an accident. He had been lately joined by three Turkiſh commanders, each of whom had a body of 10,000 men under his command. After his victories over the Moguls, theſe officers demanded the greateſt ſhare of the ſpoils; which being refuſed, they ſeparated themſelves from the ſultan. He uſed his utmoſt endeavours to make them hearken to reaſon; and ſent ſeveral meſſages and letters to them, repreſenting the inevitable ruin which muſt attend their ſeparation, as Jenghiz Khan was advancing againſt them with his whole army. At laſt they were perſuaded to lay aſide their animoſities: but it was now too late; for Jenghiz Khan, being informed of what paſſed, detached 60,000 horſe to prevent their joining the ſultan's army; who, finding himſelf deprived of this powerful aid, retired towards the river Indus. When he was arrived there, he ſtopped in a place where the ſtream was moſt rapid and the place confined, with a view both to prevent his ſoldiers from placing any hopes of ſafety in flight, and to hinder the whole Mogul army from attacking him at once. Ever ſince his departure from Gazna he had been tormented with a colic: yet, at a time when he ſuffered moſt, hearing that the enemy's vanguard was arrived at a place in the neighbourhood called *Herder*, he quitted his litter, and, mounting a horſe, marched with ſome of his choſen ſoldiers in the night; ſurpriſed the Moguls in their camp; and having cut them almoſt all in pieces, without the loſs of a ſingle man on his ſide, returned with a conſiderable booty.

Jenghiz Khan, finding by this that he had a vigilant enemy to deal with, proceeded with great circumſpection. When he came near the Indus, he drew out his army in battalia: to Jagatay, one of his ſons, he gave the command of the right wing; to Oktay, another ſon, he gave the command of the left: and put himſelf in the centre, with 6000 of his guards. On the other ſide, Jaloloddin prepared for battle like one who had no reſource but in victory. He firſt ſent the boats on the Indus farther off; reſerving only one to carry over his mother, wife, and children: but unluckily the boat ſplit when they were going to embark, ſo that they were forced to remain in the camp. The ſultan took to himſelf the command of the main body of the army. His left wing, drawn up under ſhelter of a mountain which hindered the whole right wing of the Moguls from engaging at once, was commanded by his vizir; and his right by a lord named *Amin Malek*. This lord began the fight; and forced the enemy's left wing, notwithſtanding the great diſparity of numbers, to give ground. The right wing of the Mo-

Moguls likewiſe wanting room to extend itſelf, the ſultan made uſe of his left as a body of reſerve, detaching from thence ſome ſquadrons to the aſſiſtance of the troops who ſtood in need of them. He alſo took one part of them with him when he went at the head of his main body to charge that of Jenghiz Khan; which he did with ſo much reſolution and vigour, that he not only put it in diſorder, but penetrated into the place where Jenghiz Khan had originally taken his ſtation: but that prince, having had a horſe killed under him, was retired from thence, to give orders for all the troops to engage.

This advantage had like to have loſt the Moguls the battle; for a report being immediately ſpread that the enemy had broken through the main body, the troops were ſo much diſcouraged, that they would certainly have fled had not Jenghiz Khan encouraged them by riding from place to place in order to ſhow himſelf. At laſt, however, Jaloloddin's men, who were in all but 30,000, having fought a whole day with ten times their number, were ſeized with fear, and fled. One part of them retired to the rocks which were on the ſhore of Indus, where the enemy's horſe could not follow them; others threw themſelves into the river, where many were drowned, though ſome had the good fortune to croſs over in ſafety; while the reſt, ſurrounding their prince, continued the fight through deſpair. The ſultan, however, conſidering that he had ſcarce 7000 men left, began to think of providing for his own ſafety: therefore, having bidden a final adieu to his mother, wife, and children, he mounted a freſh horſe, and ſpurred him into the river, which he croſſed in ſafety, and even ſtopped in the middle of it to inſult Jenghiz Khan, who was now arrived at the bank. His family fell into the hands of the Moguls; who killed all the males, and carried the women into captivity.

Jaloloddin being now ſecurely landed in India, got up into a tree, in order to preſerve himſelf from wild beaſts. Next day, as he walked melancholy among the rocks, he perceived a troop of his ſoldiers, with ſome officers, three of whom proved to be his particular friends. Theſe, at the beginning of the defeat, had found a boat in which they had ſailed all night, with much danger from the rocks, ſhelves, and rapid current of the river. Soon after, he ſaw 300 horſe coming towards him; who informed him of 4000 more that had eſcaped by ſwimming over the river; and theſe alſo ſoon after joined the reſt. In the mean time an officer of his houſehold, named *Jamalarrazad*, knowing that his maſter and many of his people were eſcaped, ventured to load a very large boat with arms, proviſions, money, and ſtuff to clothe the ſoldiers; with which he croſſed the river. For this important ſervice Jaloloddin made him ſteward of his houſehold, and ſurnamed him the *Choſen*, or the *Glory of the faith*. For ſome time after, the ſultan's affairs ſeemed to go on proſperouſly: he gained ſome battles in India; but the princes of that country, envying his proſperity, conſpired againſt him, and obliged him to repaſs the Indus. Here he again attempted to make head againſt the Moguls; but was at laſt defeated and killed by them, and a final end put to the once mighty empire of Gazna.

The metropolis was reduced by Oktay; who no ſooner entered the country in which it was ſituated, than he committed the moſt horrid cruelties. The city was well provided with all things neceſſary for ſuſtaining a ſiege; had a ſtrong garriſon, and a brave and reſolute governor. The inhabitants, expecting no mercy from Jenghiz Khan, who they knew had ſworn their ruin, were reſolved to make a deſparate defence. They made frequent ſallies on the beſiegers, ſeveral times overthrew their works, and broke above 100 of their battering rams. But one night, after an obſtinate fight, part of the city-walls fell down; and a great number of Moguls having filled up the ditch, entered the city ſword in hand. The governor perceiving all was loſt, at the head of his braveſt ſoldiers ruſhed into the thickeſt of his enemies, where he and his followers were all ſlain. However, Gazna was not entirely deſtroyed, nor were the people all killed; for after the maſſacre had continued four or five hours, Oktay ordered it to ceaſe, and taxed thoſe who were left alive at a certain rate, in order to redeem themſeves and the city. It does not, however, appear that after this time the city of Gazna ever made any conſiderable figure.—It was taken by the Moguls in the year 1222.

GEBRES. See GABRES.

GECCO, in natural hiſtory, a name given by the Indians to their terrible poiſon, which kills when mixed with the blood in ever ſuch a ſmall quantity. They ſay that this gecco is a venomous froth or humour vomited out of the mouths of their moſt poiſonous ſerpents; which they procure in this fatal ſtrength, by hanging up the creatures by the tails, and whipping them to enrage them: they collect this in proper veſſels as it falls; and when they would uſe it, they either poiſon a weapon with it, or wounding any part of the fleſh introduce the ſmalleſt quantity imaginable into it; and this is ſaid to be immediate death.

GECKO. See LACERTA.

GED (William), an ingenious though unſucceſsful artiſt, who was a goldſmith in Edinburgh, deſerves to be recorded for his attempt to introduce an improvement in the art of printing. The invention, firſt practiſed by Ged in 1735, was ſimply this. From any types of Greek or Roman, or any other character, he formed a plate for every page, or ſheet, of a book, from which he printed, inſtead of uſing a type for every letter, as is done in the common way. This was firſt practiſed, but on blocks of wood, by the Chineſe and Japaneſe, and purſued in the firſt eſſays of Coſter the European inventor of the preſent art. "This improvement (ſays James Ged the inventor's ſon) is principally conſiderable in three moſt important articles, viz. expence, correctneſs, beauty and uniformity." But theſe improvements were controverted.

In July 1729, William Ged entered into partnerſhip with William Fenner, a London ſtationer, who was to have half the profits, in conſideration of his advancing all the money requiſite. To ſupply this, Mr John James, then an architect at Greenwich (who built Sir Gregory Page's houſe, Bloomſbury church, &c.) was taken into the ſcheme, and afterwards his brother Mr Thomas James, a letter-founder, and James Ged the inventor's ſon. In 1730, theſe partners applied to the univerſity of Cambridge for printing bibles and common-prayer books by blocks inſtead of ſingle types; and, in conſequence, a leaſe was ſealed to them April 23d 1731. In their attempt they ſunk a large ſum of money, and finiſhed only two prayer-books; ſo that it was forced to be relinquiſhed, and the leaſe was given up in 1738. Ged imputed his diſappointments to the villainy of the preſſmen and the ill treatment of his partners (which he ſpecifies at large), particularly Fenner, whom John James and he were adviſed to proſecute, but declined it. He returned to Scotland in 1733, where he gave his friends a ſpecimen of his performance, by an edition of Salluſt. But being ſtill unſucceſsful, and having failed in obtaining redreſs from Fenner, who died inſolvent, he was preparing again to ſet out for London, in order to join with his ſon James as a printer there, when he died October 19. 1749, Thus ended his life and project; which, ingenious as it ſeems, is not likely to be revived, if, as Mr Mores ſuggeſts, "it muſt, had it firſt ſucceeded, have ſoon ſunk under its own burden," for reaſons here needleſs to recapitulate.

GEDDES (James), born of a reſpectable family in Scotland in 1610, was educated for and practiſed at the bar ſeveral years; but died of a conſumption before he arrived at the age of 40. He publiſhed *An eſſay on the compoſition and manner of writing of the ancients*; and left behind him ſeveral other tracts.

GEHENNA, a ſcripture term, which has given ſome pain to the critics. It occurs in St Mathew v. 22. 29. 30. x. 28. xviii. 9. xxiii. 15. 33. Mark ix. 43. 45. 47. Luke xii. 5. James iii. 6.

The authors of the Louvain and Geneva verſions retain the word *gehenna* as it ſtands in the Greek; the like does M. Simon: the Engliſh tranſlators render it by *hell* and *hell fire*, and ſo do the tranſlators of Mons and father Bohours.

The word is formed from the Hebrew *gehinnom*, i. e. "valley of Hinnom." In that valley, which was near Jeruſalem, there was a place named *Tophet*, where ſome Jews ſacrificed their children to Moloch, by making them paſs through the fire. King Joſias, to render this place for ever abominable, made a cloaca or common ſewer thereof, where all the filth and carcaſes in the city were caſt.

The Jews obſerve further, that there was a continual fire kept up there, to burn and conſume, theſe carcaſes; for which reaſon, as they had no proper term in their language to ſignify *hell*, they made uſe of that of *gehenna* or *gehinnon*, to denote a fire unextinguiſhable.

GELA (anc. geog.), a city of great extent on the ſouth of Sicily, taking its name from the river Gelas, which waſhes it. It was built by coloniſts from Rhodes and Crete, 45 years after the building of Syracuſe, or in the third year of the 22d Olympiad, 690 before Chriſt; originally called *Lindii*, from the coloniſts of *Lindus*, a city of Rhodes, who ſettled there firſt. Now *Terranuova*, and the river called *Fiume di Terranuova*. The people were called *Geloi*, *Gelenſes*, and *Gelani*. The City Gela, after having ſtood 408 years, was deſtroyed by Phintias, the tyrant of Agrigentum; and the inhabitants were removed to a new city, called *Phintias* after his name.

GELATINA, JELLY. See JELLY.

GELATINOUS, among the phyſicians, is applied to any thing approaching to the glutinous conſiſtence of a jelly.

GELD, in the Engliſh old cuſtoms, a Saxon word ſignifying *money*, or *tribute*. It alſo denoted a compenſation for ſome crime committed: Hence *wergeld*, in their ancient laws, was uſed for the value of a man ſlain; and *orfgeld*, of a beaſt.

GELDENHAUR (Gerard), in Latin *Geldenkarius*, an hiſtorian and Proteſtant divine in the 16th century. He was a native of Nimeguen, and ſtudied claſſical learning at Deventer. He went through his courſe of philoſophy at Louvaine, where he contracted a very ſtrict friendſhip with ſeveral learned men, and particularly with Eraſmus. He became reader and hiſtorian to Charles of Auſtria, and afterwards to Maximilian of Burgundy. At length he embraced the Proteſtant religion; taught hiſtory at Marpurg; and afterwards divinity till his death, in 1542. He wrote, 1. Hiſtory of Holland. 2. Hiſtory of the Low Countries; 3. Hiſtory of the Biſhops of Utrecht: and other works.

GELDERLAND. See GUELDERLAND.

GELDERS. See GUELDERLAND.

GELDING, the operation of caſtrating any animal, particularly horſes.

If the operation is to be performed on a colt, he may be gelded at nine or fifteen days old, if the teſticles be come down: in regard the ſooner he is gelt the better it will be for his growth, ſhape, and courage; though a horſe may be gelt at any age, if proper care is taken in the cure.

The manner of gelding is as follows. The beaſt being caſt down on ſome ſoft place, the operator takes the ſtones between his foremoſt and his great finger, and ſlitting the cod preſſes the ſtones forth; then taking a pair of nippers made very ſmooth, either of ſteel, box, or brazil-wood, he claps the ſtrings of the ſtones between them, very near to where the ſtones are ſet on, and preſſes them ſo hard that there may be no flux of blood; then with a thin, drawing, cauteriſing iron, ſears away the ſtone. This done, he takes a hard plaſter made of roſin, wax, and waſhed turpentine, well diſſolved together, and melts it on the head of the ſtrings: he then ſears them, and melts more of the ſalve, till ſuch time as he has laid a good thickneſs of it upon the ſtrings.

When is this done to one ſtone, the nipppers are looſened, and the like is done to the other; and the two ſlits of the cod are then filled with white ſalt, and the outſide of the cod is anointed with hog's greaſe: and thus they let him riſe, and keep him in a warm ſtable, without tying him up. If he ſwells much in his cods or ſheath, they chafe him up and down, and make him trot for an hour in a day, which ſoon recovers him.

The manner of gelding a hog is as follows: The operator, after having made two croſs ſlits or inciſions on the midſt of the ſtones, preſſes them out, and anoints the ſore with tar. But another general method, yet ſomewhat more dangerous if not well done, is, firſt to cut the ſtone on the top, and after having drawn that one forth, the operator puts in his fingers at the ſame ſlit, and with a lancet cuts the ſkin between the two ſtones, and by that ſlit preſſes out the other ſtone. Then having cleanſed out the blood, he anoints the part with freſh greaſe: and thus there is but one inciſion made in the cod. Boar-pigs ought to be gelt about ſix months old; yet they are commonly gelded about three weeks or a month old.

GELE'E (Claude). See CLAUDE.

GELENHAUSEN, a ſmall imperial town of Wetteravia in Germany, with a caſtle built by the emperor Frederic I. E. Long. 8. 13. N. Lat 50. 20.

GELENIUS (Sigiſmund), a learned and excellent man born of a good family at Prague, about the year 1498. Eraſmus conceiving an eſteem for him at Baſil, recommended him to John Frobenius as a corrector for his printing-houſe; which laborious charge he accepted, and had a great number of Hebrew, Greek, and Latin books to correct: he alſo tranſlated many works himſelf from the Greek into Latin; and publiſhed a dictionary in four languages, Greek, Latin, German, and Sclavonian. Profitable and honourable employments were offered him in other places, but nothing could tempt him to quit his peaceful ſituation at Baſil. He died in 1555. All his tranſlations are highly eſteemed.

GELINOTTE, or GRUS, in ornithology. See TETRAO.

GELLERT (Chriſtian), one of the fineſt geniuſes Germany has produced, was born at Hænichen, near Freyburgh in Saxony, in 1715, and ſtudied at Leipſic; at which univerſity he was for many years profeſſor of philoſophy and the belles lettres. He early diſtinguiſhed himſelf by his talent for poetry; and contracted a ſtrict friendſhip with the moſt learned and polite writers in Germany. All his works are filled with ſentiment, and bear the impreſſion of the ſweetneſs of his diſpoſition. The moſt conſiderable of them are his comedies, his ſpiritual ſongs, and moral poems, and particularly his ſacred odes, his fables, and his tales. He died in 1769, much lamented.

GELLI (John Baptiſt), an eminent Italian writer, was born of mean parents at Florence, in the year 1498. He was bred a taylor: but had ſuch an extraordinary genius, that he acquired ſeveral languages, and made an uncommon progreſs in the belles lettres; and though he continued always to work at his trade, became acquainted with all the wits and learned men at Florence, and his merit was univerſally known. He was choſen a member of the academy there, and the city made him a burgeſs. He acquired the higheſt reputation by his works, which are. 1. *I. Caprici del Bottaio*, quarto; which contains ten dialogues. 2. *La Circe*, octavo. This, which alſo contains ten dialogues, and treats of human nature, has been tranſlated into Latin, French, and Engliſh. 3. Diſſertations in Italian on the poems of Dante and Petrarch. 4. The comedies of *La Sporta* and *La Errore*; and other works. He died in 1563.

GELLIBRAND (Henry) a laborious aſtronomer of the laſt century, was born in 1597. Though he was not without good views in the church, yet he became ſo enamoured with mathematical ſtudies, that on the death of his father he became a ſtudent at Oxford, contented himſelf with his private patrimony, and devoted himſelf ſolely to them. On the death of Mr Gunter, he was recommended by Mr Briggs to the truſtees of Greſham college, for the aſtronomical profeſſorſhip there; to which he was elected in 1627. His friend Mr Briggs dying in 1630, before he had finiſhed his *Trigonometrica Britannica*, it was finiſhed by Gellibrand at his requeſt. He wrote ſeveral other things chiefly tending to the improvement of navigation: and died in 1636.

GELLIUS (Aulus), a celebrated grammarian, who lived in the 2d century under Marcus Aurelius and ſome ſucceeding emperors. He wrote a collection of obſervations on authors, for the uſe of his children; and called it *Noctes Atticæ*, becauſe compoſed in the evenings of a winter he ſpent at Athens. The chief value of it, is for preſerving many facts and monuments of antiquity not to be found elſewhere. Critics and grammarians have beſtowed much pains on this writer.

GELLY. See JELLY.

GELO, or GELON, a ſon of Dinomenes who made himſelf abſolute at Syracuſe 484 years before the Chriſtian era. He conquered the Carthaginians at Himera, and made his oppreſſion popular by his great equity and moderation. He reigned ſeven years, and his death was univerſally lamented at Syracuſe. He was called the father of his people, and the patron of liberty, and honoured as a demigod. His brother Hiero ſucceeded him. See SYRACUSE.

GEM, in natural hiſtory, a common name for all precious ſtones; of which there are two claſſes, the pellucid and ſemipellucid.

The bodies compoſing the claſs of pellucid gems are bright, elegant, and beautiful foſſils, naturally and eſſentially compound, ever found in ſmall detached maſſes, extremely hard, and of great luſtre.

The bodies compoſing the claſs of ſemipellucid gems, are ſtones naturally and eſſentially compound, not inflammable nor ſoluble in water, found in detached maſſes, and compoſed of cryſtalline matter debaſed by earth: however, they are but ſlightly debaſed, and are of great beauty and brightneſs, of a moderate degree of tranſparency, and are uſually found in ſmall maſſes.

The knowledge of gems depends principally on obſerving their hardneſs and colour. Their hardneſs is commonly allowed to ſtand in the following order: The diamond the hardeſt of all; then the ruby, ſapphire, jacinth, emerald, amethyſt, garnet, carneol, chalcedony, onyx, jaſper, agate, porphyry, and marble. This difference, however, is not regular and conſtant, but frequently varies. Good cryſtals may be allowed to ſucceed the onyx; but the whole family of metallic glaſſy fluors ſeem to be ſtill ſofter.—In point of colour, the diamond is valued for its tranſparency, the ruby for its purple, the ſapphire for its blue, the emerald for its green, the jacinth for its orange, the amethyſt carneol for its carnation, the onyx for its tawny, the jaſper, agate, and porphyry, for their vermilion, green, and variegated colours, and the garnet for its tranſparent blood-red.

All theſe gems are ſometimes found coloured and ſpotted, and ſometimes quite limpid and colourleſs. In this caſe the diamond-cutter or poliſher knows how to diſtinguiſh their different ſpecies by their different degrees of hardneſs upon the mill. For the cutting or poliſhing of gems, the fine powder of the fragments of thoſe that are next in degree of hardneſs is always required to grind away the ſofter; but as none of them are harder than the diamond, this can only be poliſhed by its own powder.

Cronſtedt obſerves of gems in general, that the colour of the ruby and emerald are ſaid to remain in the fire, while that of the topaz flies off: hence it is uſual to burn the topaz, and thence ſubſtitute it for the diamond. "Their colours (ſays our author) are commonly ſuppoſed to depend upon metallic vapours; but may they not more juſtly be ſuppoſed to ariſe from a phlogiſton united with a metallic or ſome other earth? becauſe we find that metallic earths which are perfectly well calcined give no colour to any glaſs; and that the manganeſe, on the other hand, gives more colour than can be aſcribed to the ſmall quantity of metal which is to be extracted from it." M. Magellan is of opinion, that their colour is owing chiefly to the mixture of iron which enters their compoſition; but approves the ſentiment of Cronſtedt, that phlogiſton has a ſhare in their production, it being well known that the calces of iron when dephlogiſticated produce the red and yellow colours of marble, and when phlogiſticated to a certain degree produce the blue or green colours.

With regard to the texture of gems, M. Magellan obſerves, that all of them are foliated or laminated, and of various degrees of hardneſs. Whenever the edges of theſe laminæ are ſenſible to the eye, they have a fibrous appearance, and reflect various ſhades of colour, which change ſucceſſively according to their angular poſition to the eye. Theſe are called by the French *chatorantes*; and what is a blemiſh in their tranſparency, often enhances their value on account of their ſcarcity. But when the ſubſtance of a gem is compoſed of a broken texture, conſiſting of various ſets of laminæ differently inclined to each other, it emits at the ſame time various irradiations of different colours, which ſucceed one another according to their angle of poſition. This kind of gems has obtained the name of *opals*, and are valued in proportion to the brilliancy, beauty, and variety of their colours. Their cryſtallization, no doubt, depends on the ſame cauſe which produces that of ſalts, earths, and metals, which is treated of under the article CRYSTALLIZATION: but as to the particular configuration of each ſpecies of gems, we can hardly depend upon any individual form as a criterion to aſcertain each kind; and when we have attended with the utmoſt care to all that has been written on the ſubject, we are at laſt obliged to appeal to chemical analyſis, becauſe it very often aſſumes various forms. The following table ſhows the component parts of gems according to the analyſis of Bergman and M. Achard; the letter B prefixed to each denoting Berman's analyſis, and A that of Achard.

		Argil.	Silic.	Calc.	Iron.
Red oriental ruby, -	B	40	39	9	10
Ditto, - -	A	37.5	42.5	9	11
Blue oriental ſapphire,	B	58	35	5	2
Ditto, - -	A	58	33	6	3
Yellow topaz from Saxony,	B	46	39	8	6
Green oriental emerald,	B	60	24	8	6
Ditto, - -	A	60	23	10	7
Yellow-brownorient.hyacinth,	B	40	25	20	13
Ditto, - -	A	42	22	20	16
Tourmalin from Ceylon,	B	39	37	15	9
Ditto from braſil, -	B	50	34	11	5
Ditto from Tyrol, -	B	42	40	12	6
Garnet from Tyrol, -	A	30	48	11	10

The chryſopraſe from Koſeinitz in Sileſia was likewiſe analyſed by M. Achard; who found that it contained 456 grains of ſiliceous earth, 13 of calcareous, 6 of magneſia, 3 of copper, and 2 of iron. "This (ſays M. Magellan) ſeems to be the only gem that contains no argillaceous earth."

Imitation or Counterfeiting of GEMS *in Glaſs.* The art of imitating gems in glaſs is too conſiderable to be paſſed without notice: ſome of the leading compoſitions therein we ſhall mention upon the authority of Neri and others.

Theſe gems are made of paſtes; and are noway inferior to the native ſtones, when carefully made and well poliſhed, in brightneſs or tranſparence, but want their hardneſs.

The general rules to be obſerved in making the paſtes are theſe: 1. That all the veſſels in which they are made be firmly luted, and the lute left to dry before they are put into the fire. 2. That ſuch veſſels be choſen for the work as will bear the fire well. 3. That the powders be prepared on a porphyry ſtone; not in a metal mortar, which would communicate a tinge to them. 4. That the juſt proportion in the quantity of the ſeveral ingredients be nicely obſerved. 5. That the materials be all well mixed; and, if not ſufficiently baked the firſt time, to be committed to the fire again, without breaking the pot: for if this be not obſerved, they will be full of bliſters and air-bladders. 6. That a ſmall vacuity be always left at the top of the pot, to give room to the ſwelling of the ingredients.

To make paſte of extreme hardneſs, and capable of all the colours of the gems, with great luſtre and beauty.—Take of prepared cryſtal ten pounds: ſalt of polverine, ſix pounds; ſulphur of lead, two pounds; mix all theſe well together into a fine powder; make the whole with common water into a hard paſte; and make this paſte into ſmall cakes of about three ounces weight each, with a hole made in their middle; dry them in the ſun, and afterwards calcine them in the ſtraiteſt part of a potter's furnace. After this, powder them, and levigate them to a perfect fineneſs on a porphyry-ſtone, and ſet this powder in pots in a glaſs-furnace to purify for three days: then caſt the whole into water, and afterwards return it into the furnace, where let it ſtand 15 days, in which time all foulneſs and bliſters will diſappear, and the paſte will greatly reſemble the natural jewels. To give this the colour of the emerald, add to it braſs thrice calcined; for a ſea-green, braſs ſimply calcined to a redneſs; for a ſapphire, add zaffer, with manganeſe; and for a topaz, maganeſe and tartar. All the gems are thus imitated in this, by the ſame way of working as the making of coloured glaſſes: and this is ſo hard, that they very much approach the natural gems.

The colour of all the counterfeit gems made of the ſeveral paſtes, may be made deeper or lighter, according to the work for which the ſtones are deſigned; and it is a neceſſary general rule, that ſmall ſtones for rings, &c. require a deeper colour, and large ones a paler. Beſides, the colours made from manganeſe, verdegris, and zaffer, which are the ingredients commonly uſed, there are other very fine ones which care and ſkill may prepare. Very fine red may be made from gold, and one not much inferior to that from iron; a very fine green from braſs or copper; a ſky-colour from ſilver, and a much finer one from the granates of Bohemia.

A very ſingular and excellent way of making the paſte to imitate the coloured gems in this: Take a quantity of ſaccharum ſaturni, or ſugar of lead, made with vinegar in the common way; ſet it in ſand, in a glaſs body well luted from the neck downwards; leave the mouth of the glaſs open, and continue the fire 24 hours; then take out the ſalt, and if it be not red but yellowiſh, powder it fine, and return it into the veſſel, and keep it in the ſand-heat 24 hours more, till it becomes as red as cinnabar. The fire muſt not be made ſo ſtrong as to melt it, for then all the proceſs is ſpoiled. Pour diſtilled vinegar on this calcined ſalt, and ſeparate the ſolution from the dregs; let the decanted liquor ſtand ſix days in an earthen veſſel, to give time for the finer ſediment to ſubſide; filter this liquor, and evaporate it in a glaſs body, and there will remain a moſt pure ſalt of lead; dry this well, then diſſolve it in fair water; let the ſolution ſtand ſix days in a glazed pan; let it ſubſide, then filtre the clear ſolution, and evaporate it to a yet more pure white and ſweet ſalt; repeat this operation three times; put the now perfectly pure ſalt into a glaſs veſſel, ſet it in a ſand-heat for ſeveral days, and it will be calcined to a fine impalpable powder, of a lively red. This is called *the ſulphur of lead.*

Take all the ingredients as in the common compoſition of the paſtes of the ſeveral colours, only inſtead of red lead, uſe this powder; and the produce will well reward the trouble of the operation, as experience has often proved.

A paſte proper for receiving colours may be readily made by well-pounding and mixing ſix pounds of white ſand cleanſed, three pounds of red lead, two pounds of purified pearl-aſhes, and one pound of nitre. A ſofter paſte may be made in the ſame manner, of ſix pounds of white ſand cleanſed; red lead, and purified pearl-aſhes, of each three pounds; one pound of nitre, half a pound of borax, and three ounces of arſenic. For common uſe a pound of common ſalt may be ſubſtituted for the borax. This glaſs will be very ſoft, and will not bear much wear if employed for rings, buckles, or ſuch imitations of ſtones as are expoſed to much rubbing; but for ear-rings, ornaments worn on the breaſt, and thoſe little uſed, it may laſt a conſiderable time.

In order to give paſte different colours, the proceſs is as follows. For

Amethyſt. Take ten pounds of either of the compoſitions deſcribed under *Colouring of* GLASS, one ounce and a half of manganeſe, and one dram of zaffer; powder and fuſe them together.

Black. Take ten pounds of either of the compoſitions juſt referred to, one ounce of zaffer, ſix drams of manganeſe, and five drams of iron, highly calcined; and proceed as before.

Blue. Take of the ſame compoſition ten pounds; of zaffer ſix drams; and of manganeſe two drams; and proceed as with the foregoing.

Chryſolite. Take of either of the compoſitions for paſte above deſcribed, prepared without ſaltpetre, ten pounds, and of calcined iron five drams; and purſue the ſame proceſs as with the reſt.

Red Cornelian. Take of the compoſitions mentioned under *Colouring of* GLASS two pounds; of glaſs of antimony one pound; of the calcined vitriol called *ſcarlet oker* two ounces: and of manganeſe one dram. Fuſe the glaſs of antimony and manganeſe with the compoſition; then powder them, and mix them with the other, by grinding them together, and fuſe them with a gentle heat.

White Cornelian. Take of the compoſition juſt referred to two pounds; and of yellow oker well waſhed two drams; and of calcined bones one ounce. Mix them, and fuſe them with a gentle heat.

Diamond. Take of the white ſand ſix pounds; of red-lead four pounds; of pearl aſhes purified three pounds; of nitre two pounds; of arſenic five ounces; and of manganeſe one ſcruple. Powder and fuſe them.

Eagle-marine. Take ten pounds of the compoſition under GLASS; three ounces of copper highly calcined with ſulphur; and one ſcruple of zaffer. Proceed as before.

Emerald. Take of the ſame compoſition with the laſt nine pounds; three ounces of copper precipitated from aquafortis; and two drams of precipitated iron. See EMERALD.

Garnet. Take two pounds of the compoſition under GLASS; two pounds of the glaſs of antimony, and two drams of manganeſe. For vinegar garnet, take of the compoſition for paſte, deſcribed in this article, two pounds; one pound of glaſs of antimony, and half an ounce of iron, highly calcined; mix the iron with the uncoloured paſte, and fuſe them; then add the glaſs of antimony powdered, and continue them in the heat till the whole is incorporated.

Gold or *full yellow.* Take of the compoſition for paſte ten pounds, and one ounce and a half of iron ſtrongly calcined; proceeding as with the others.

Deep purple. Take of either of the compoſitions for paſte ten pounds; or manganeſe one ounce; and of zaffer half an ounce.

Ruby. Take one pound of either of the compoſitions for paſte, and two drams of *calx caſſii*, or precipitation of gold by tin; powder the paſte, and grind the calx of gold with it in a glaſs, flint, or agate mortar, and then fuſe them together. A cheaper ruby paſte may be made with half a pound of either of the above compoſitions, half a pound of glaſs of antimony, and one dram and a half of the calx of gold; proceeding as before.

Sapphire. Take of the compoſition for paſte ten pounds: of zaffer three drams and one ſcruple; and of the *calx Caſſii* one dram. Powder and fuſe them. Or the ſame may be done, by mixing with the paſte one-eighth of its weight of ſmalt.

Topaz. Take of the compoſitions under GLASS ten pounds, omitting the ſaltpetre; and an equal quantity of the *Gold-coloured hard* GLASS. Powder and fuſe them. See TOPAZ.

Turquoiſe. Take of the compoſition for blue paſte already deſcribed, ten pounds; of calcined bone horn, or ivory, half a pound. Powder and fuſe them.

Opake white. Take of the compoſition for paſte ten pounds; and one pound of calcined horn, ivory, or bone; and proceed as before.

Semitranſparent white, like opal. See OPAL.

To the above we ſhall add the following receipts and proceſſes, contained in a Memoir by M. Fontanieu of the Royal Academy of Sciences at Paris, and ſaid to have met with much approbation.

I. *Of the Baſes.* Although the different calces of lead are all adapted to produce the ſame effect in vitrification; yet M. Fontanieu prefers lead in ſcales, and next to that minium, as being the moſt conſtantly pure. It is neceſſary to ſift through a ſilk ſieve the preparations of lead one wiſhes to make uſe of in the vitrification, in order to ſeparate the groſſer parts, as alſo the lead found in a metallic ſtate when white lead in ſcales is employed.

The baſe of factitious gums is calx of lead and rock-cryſtal, or any other ſtone vitrifiable by the calces already mentioned. Pure ſand, flint, and the tranſparent pebbles of rivers, are ſubſtances equally fit to make glaſs: but as it is firſt neceſſary to break the maſſes of cryſtal, ſtones, or pebbles, into ſmaller parts; ſo by this operation particles of iron or copper are frequently introduced, and to theſe duſt or greaſy matters are alſo apt to adhere. Our author therefore begins by putting the pounded cryſtal or pebbles into a crucible, which he places in a degree of heat capable of making the maſs red-hot; he then pours it into a wooden bowl filled with very clear water; and ſhaking the bowl from time to time, the ſmall portions of coals furniſhed by the extraneous bodies ſwim on the ſurface of the water, and the vitrifiable earth, with the iron, &c. reſts on the bottom. He then decants the water; and having dried the maſs, he pounds it, ſifts the powder through the fineſt ſilk ſieve: he then digeſts the powder during four or five hours with marine acid, ſhaking the mixture every hour. After having decanted the marine acid from the vitrifiable earth, he waſhes the latter until the water no longer reddens the tincture of tournſol. The ſaid earth being dried, is paſſed through a ſilk ſieve, and is then fit for uſe. Nitre, ſalt of tartar, and borax, are the three ſpecies of ſalts that enter with quartz and the ſeveral calces of lead into M. Fontanieu's vitrifications.

Much of the ſucceſs in the art of making coloured ſtones depends on the accurate proportion of the ſubſtances made uſe of to form the cryſtal which ſerves as a baſe to the factitious ſtones. After having tried a great variety of receipts, our author found they might be reduced to the following.

1. Take two parts and a half of lead in ſcales, one part and a half of rock-cryſtal or prepared flints, half a part of nitre, as much borax, and a quarter part of glaſs of arſenic. Theſe being well pulveriſed and mixed together, are to be put into a Heſſian crucible, and ſubmitted to the fire. When the mixture is well melted, pour it into cold water: then melt it again a ſecond and a third time; taking care, after each melting, to throw it into freſh cold water, and to ſeparate from it the lead that may be revived. The ſame crucible ſhould not be uſed a ſecond time, becauſe the glaſs of lead is apt to penetrate it in ſuch a manner as to run the riſk of loſing the contents. One muſt alſo be careful to cover the crucible well, to prevent any coals getting into it, which would reduce the calx of lead, and ſpoil the compoſition.

2. Take two parts and a half of white ceruſs, one part of prepared flints, half a part of ſalt of tartar, and a quarter part of calcined borax: melt the mixture in a Heſſian crucible, and then pour it into cold water; it is then to be melted again, and waſhed a ſecond and a third time, the ſame precautions being obſerved as for the firſt baſe.

3. Take two parts minium, one part rock-cryſtal, half a part of nitre, and as much ſalt of tartar: this mixture being melted, muſt be treated as the former.

4. Take three parts of calcined borax, one part of prepared rock-cryſtal, and one part of ſalt of tartar; theſe being well mixed and melted together, muſt be poured into warm water: the water being decanted and the maſs dried; an equal quantity of minium muſt be added to it; it is then to be melted and waſhed ſeveral times as directed above.

5. That called by our author the *Mayence baſe*, and which he conſiders as one of the fineſt cryſtalline compoſitions hitherto known, is thus compoſed: Take three parts of fixed alkali of tartar, one part of rock-cryſtal or flint pulverized: the mixture to be well baked together, and then left to cool. It is afterwards poured into a crucible of hot water to diſſolve the fritt; the ſolution of the fritt is then received into a ſtone-ware pan, and aquafortis added gradually to the ſolution till it no longer effervesces: this water being decanted, the fritt muſt be waſhed in warm water till it has no longer any taſte: the fritt is then dried, and mixed with one part and a half of fine ceruſs or white lead in ſcales; and this mixture muſt be well levigated with a little diſtilled water. To one part and a half of this powder dried add an ounce of calcined borax; let the whole be well mixed in a marble mortar, then melted and poured into cold water as the other baſes already deſcribed. Theſe fuſions and lotions having been repeated, and the mixture dried and powdered, a 12th part of nitre muſt be added to it, and then melted for the laſt time; when a very fine cryſtal will be found in the crucible.

6. As a compoſition for furniſhing very fine white ſtones: Take eight ounces of ceruſs, three ounces of rock-cryſtal pulveriſed, two ounces of borax finely powdered, and half a grain of manganeſe; having melted and waſhed this mixture in the manner directed above, it will produce a very fine white cryſtal.

II. *Of the Colours.* The calces of metals, as already obſerved, are the ſubſtances employed to colour factitious gems; and on the preparation of theſe calces depends the vividneſs of their colours.

a, From *Gold.*] To obtain the mineral purple known by the name of *precipitate of Caſſius*, M. Fontanieu employs the following proceſſes.

1. Diſſolve ſome pure gold in aqua regia, prepared with three parts of precipitated nitrous acid and one part of marine acid; and to haſten the diſſolution, the matraſs ſhould be placed in a ſand-bath. Into this ſolution pour a ſolution of tin in aqua regia. The mixture becomes turbid, and the gold is precipitated with a portion of the tin, in the form of a reddiſh powder; which, after being waſhed and dried, is called *precipitate of Caſſius.*—The aqua regia employed to diſſolve the tin is compoſed of five parts nitrous acid and one part of marine acid: to eight ounces of this aqua regia are added ſixteen ounces of

diſtilled water. Some leaves of Malacca tin, about the ſize and thickneſs of a ſixpence, are then put into this diluted aqua regia, till it will diſſolve no more of them: which operation, our author obſerves, requires commonly twelve or fourteen days; though it might probably be haſtened by beating the tin ſtill thinner, and then rolling it into the form of a hollow cylinder, or turning it round into ſpiral convolutions, and thus expoſing a greater extent of ſurface to the action of the menſtruum. In order to prepare more readily the precipitate of Caſſius, M. Fontanieu puts into a large jug eight ounces of ſolution of tin, to which he adds four pints of diſtilled water: he afterwards pours into this metallic lye ſome ſolution of gold, drop by drop, taking care to ſtir the whole with a glaſs tube: when the mixture becomes of a deep purple colour, he ceaſes dropping the ſolution of gold; and in order to haſten the precipitation of the mineral purple, pours into the mixture a pint of freſh urine. Six or ſeven hours after, the precipitate is collected at the bottom of the veſſel: the fluid is then decanted; and the precipitate, waſhed once or twice, is dried till it becomes a brown powder.

2. Pour into a veſſel of fine tin with a thick bottom four ounces of the ſolution of gold; three minutes after add two pints of diſtilled water. Let this mixture ſtand in the tin veſſel during ſeven hours, taking care to ſtir it every hour with a glaſs tube; afterwards pour it into a conical glaſs jug, and add to it a pint of new urine: the mineral purple is ſoon precipitated, and then is to be waſhed and dried.

3. Diſtil in a glaſs cornute placed in a bath of aſhes, ſome gold diſſolved in aqua regia, made with three parts nitrous and one part marine acid; when the acid is paſſed over and the gold contained in the cornute appears dry, leave the veſſel to cool, then pour into it ſome new aqua regia, and proceed to diſtil as before. Replace the aqua regia twice upon the gold and diſtil the ſame. After theſe four operations, pour by little and little into the cornute ſome oil of tartar *per deliquium*, which will occaſion a briſk efferveſcence: when this ceaſes, diſtil the mixture till it becomes dry, and then put ſome warm water into the cornute. Shake the whole, and put it into a cucurbit, when a precipitate is depoſited the colour of which is ſometimes brown and ſometimes yellow: After having waſhed this precipitate, dry it. Our author ſays, this mineral purple was much ſuperior to the foregoing, ſince two grains of it only were ſufficient to an ounce of the baſe, whilſt it required of the other two a 20th part of the baſe. And he adds; that he found a means of exalting the colour of the precipitate of Caſſius, by putting to it a ſixth part of its weight of glaſs of antimony finely powdered, and of nitre in the proportion of a dram to eight ounces of the baſe.

b, From *Silver*.] The calx of ſilver, being vitrified, produces a yellowiſh grey colour. This calx enters only into the compoſition of the yellow artificial diamond and the opal. M. Fontanieu introduces it into the baſe in the form of luna cornea.

In order to prepare it, he directs to diſſolve the ſilver in precipitated nitrous acid, and afterwards to pour it into a ſolution of ſea-ſalt: a white precipitate is obtained; which, being waſhed and dried, melts very readily in the fire, and is ſoon volatilized if not mixed with vitrifiable matters. To make the yellow diamond, 25 grains of this luna cornea are put to an ounce of the fourth baſe: the doſe of ſilver may be diminiſhed according to the ſhade of yellow that one wiſhes to procure.

c, From *Copper*.] The calx of copper imparts to white glaſs the fineſt green colour; but if this metal be not exactly in a ſtate of calx, it produces a browniſh red colour. *Mountain blue*, *verdegris*, and the reſidue of its diſtillation, are the different preparations of copper which our author employs to make the artificial emeralds.

d, From *Iron*.] Although it has been aſſerted, that the calces of iron introduce a very fine tranſparent red colour into white glaſs, M. Fontanieu could only obtain from it a pale red a little opake. The calx of iron that he employed was in the proportion of the 20th part of the baſe.

There are ſeveral ways of preparing the calx of iron called *crocus Martis*, or *ſaffron of Mars*. In general, it is neceſſary that this metal be ſo far deprived of its phlogiſton, that the magnet ceaſes to attract it: thus one may uſe the ſcales of iron found upon the bars of the furnaces, which ſerve to diſtil aquafortis. By digeſting filings of ſteel with diſtilled vinegar, then evaporating and replacing the vinegar 10 or 12 times upon theſe filings and drying them alternately, a calx of iron is obtained, which muſt be ſifted through a ſilk ſieve, and then calcined. The calx of iron thus obtained by the vinegar, our author ſays, only introduced into his baſes a green colour inclining to a yellow.

By the following proceſs a ſaffron of Mars of the fineſt red colour is obtained: Let an ounce of iron filings be diſſolved in nitrous acid in a glaſs cornute, and diſtilled over a ſand-bath to dryneſs. After having replaced the acid or the dry calx, and re-diſtilled it a ſecond and a third time, it is then edulcorated with ſpirits of wine, and afterwards waſhed with diſtilled water.

e, From the *Magnet*.] It is neceſſary to calcine the magnet before it be introduced into the vitrifications. Having therefore torrified the magnet during two hours, it muſt be waſhed and dried. It is only employed in the compoſition of the opal.

f, From *Cobalt*.] The calx of cobalt is only proper to introduce a blue colour into glaſs; but this ſemimetal is rarely found free from iron and biſmuth, and therefore it is firſt neceſſary to ſeparate them from it. This is done by calcining the ore of cobalt in order to diſengage the arſenic: afterwards the calx muſt be diſtilled in a cornute with ſal ammoniac, and the iron and the biſmuth are found ſublimed with this ſalt. The diſtillation muſt be repeated with the ſal ammoniac till this ſalt is no longer coloured yellow. The cobalt which remains in the cornute is then calcined in a potſherd, and becomes a very pure calx; which being introduced into the baſe, in the proportion of a 900dth part, gives it a very fine blue colour, the intenſity of which may be increaſed at diſcretion by the addition of calx of cobalt. In order to prepare *black enamel* reſembling that which is called *black agate* of Iceland; melt together a pound and a half of one of the baſes, two ounces of the calx of cobalt, two ounces of *crocus Martis*, prepared with vinegar, and two ounces of manganeſe.

g, From *Tin*.] The calx of tin is not vitrifiable alone, and when deprived of phlogiſton is of a white colour; it renders opake the glaſs with which it is melted, and forms white enamel. For this purpoſe, calcine the putty of tin; then waſh and dry it, and ſift it through a ſilk ſieve. Take ſix pound of the ſecond baſe, the ſame quantity of the calcined putty of tin, and 48 grains of manganeſe.

h, From *Antimony*.] Antimony is only ſuſceptible of vitrification when its calx contains phlogiſton, and then it produces a reddiſh or hyacinth coloured glaſs; but if the antimony be in a ſtate of abſolute calx, ſuch as the diaphoretic antimony, then it is no longer vitrifiable and may be ſubſtituted for calx of tin to make white enamel. M. Fontanieu introduces the glaſs of antimony in the compoſition of artificial topazes. For the *oriental topaz*, he takes 24 ounces of the firſt baſes and five drachms of the glaſs of antimony. To imitate the *topaz of Saxony*, he adds to each ounce of the baſe five grains of the glaſs of antimony. For the *topaz of Brazil*, he takes 24 ounces of the firſt baſe, one ounce 24 grains of glaſs of antimony, and 8 grains of the *precipitate of Caſſius*.

i, From *Manganeſe*.] This mineral, employed in a ſmall quantity, renders the glaſs whiter: a larger quantity produces a very fine violet colour, and a ſtill larger doſe of it renders the glaſs black and opake.

There are two ways of preparing manganeſe, 1. The moſt ſimple conſiſts in expoſing it to a red heat, and then quenching it with diſtilled vinegar; it is afterwards dried and powdered, in order to paſs it through a ſilk ſieve. 2. Haudiquer de Blancour deſcribes the ſecond manner of preparing the manganeſe, proper to furniſh a red colour, and names it *fuſible manganeſe*. Take of manganeſe of Piedmont one pound; torrify and pulverize it; then mix it with a pound of nitre, and calcine the mixture during 24 hours; afterwards waſh it repeatedly in warm water, till the water of the lyes has no longer any taſte; dry the manganeſe, and mix with it an equal weight of ſal ammoniac; levigate this mixture on a ſlab of porphyry with oil of vitriol diluted with water to the ſtrength of vinegar. Dry the mixture, and introduce it into a cornute; diſtil by a graduated fire; and when the ſal ammoniac is ſublimed, weigh it, and add to the mixture an equal quantity. Then diſtil and ſublime as before, and repeat the operation ſix times, being careful at each time to mix the ſal ammoniac and the manganeſe upon the prophyry with diluted oil of vitriol.

At Tournhault in Bohemia, there is ſold a fuſible glaſs of a yellow colour, very like that of the topaz of Brazil, which, when expoſed to a degree of fire in a cupel ſufficient to redden it, becomes of a very fine ruby colour, more or leſs deep according to the degree of fire to which it has been expoſed. Our author aſſayed this glaſs, and found it to contain a great deal of lead, but was not able to diſcover any gold in it.

III. *Of the different degrees of fire neceſſary for factitious Gems*. Our author obſerves, that there are three degrees of heat very different in their energy. The fire kept up in the wind furnaces in the laboratories of chemiſts, is leſs active than that whoſe effect is accelerated by the means of bellows; and a fire ſupported by wood, and kept up during 60 hours, without interruption, produces ſingular effects in vitrification, and renders the glaſs finer and leſs alterable.

When recourſe is had to the forge, in order to operate a vitrification, it is neceſſary to turn about the crucible from time to time, that the maſs may melt equally. Some coal alſo ſhould be replaced, in proportion as it conſumes towards the nozel of the bellows; for without this precaution, we ſhould run the riſk of cooling the crucible oppoſite to the flame, and probably of cracking it, when all the melted maſs running among the coals would be totally loſt. Though this is the readieſt way of melting, it ſhould not be employed out of choice; for the crucible often breaks, or coals get into it, and reduce the calyx of lead to a metallic ſtate.

The wind-furnace is either ſquare or round. A ſmall cake of baked clay or brick, of the thickneſs of an inch, is placed upon the grate; and upon this cake is placed the crucible, ſurrounded with coal. The degree of heat produced by this furnace is much leſs than that of the forge: but in order to ſucceed in the vitrification, M. Fontanieu recommends the uſe of a furnace deſcribed by Kunckle, which, with ſome neceſſary alterations, is repreſented on Plate CCXX. The interior part is ſo diſpoſed, that we may place crucibles at three different heights; and the name of *chambers* is given to thoſe ſteps upon which the crucibles are placed. Fig. 4. is a plan of the kiln at the firſt chamber, and fig. 5. a plan of the kiln where the fire is placed. Fig. 6. exhibits the elevation; A the aſh-pit; B the door to put in the wood; C the door of the firſt chamber: D the door of the ſecond chamber; E the third chamber; F the flue or chimney; GG iron hoops which ſurround the kiln to ſtrengthen it. Fig. 7. is a ſection of the kiln: H the aſh-pit with its air-hole; I the chamber for the fire with an air-hole; K the firſt chamber for the crucibles; L the ſecond chamber; M the dome; N the chimney; OO air-holes.

It is obvious, that the degree of heat cannot be equal in the ſaid three chambers. The chamber K is that where the heat is greateſt, afterwards in that of L, and laſtly, in that of M. We ſhould begin by placing the crucibles according to their ſize, in theſe different chambers; by which means the beſt effect in vitrification is produced.

In order to conduct the fire well, only three billets of white wood ſhould be put into the furnace at a time for the firſt 20 hours, four billets at a time for the next 20 hours, and ſix billets for the laſt 20 hours; in all 60 hours. The furnace is then left to cool, care being taken to ſtop the air-holes with ſome lute; and in about 48 hours after, when the kiln is quite cold, the crucible is to be withdrawn.

IV. *The Compoſitions*. 1. For the white diamond: Take the baſe of Mayence. This cryſtal is very pure, and has no colours.

2. For the yellow diamond: to an ounce of the fourth baſe, add for colour 25 grains of luna cornea or 10 grains of glaſs of antimony.

3. For the emerald: 1. To 15 ounces of either of the baſes, add for colour one dram of mountain-blue and ſix

grains of glaſs of antimony ; or, 2. To an ounce of the ſecond baſe, add for colour 20 grains of glaſs of antimony and three grains of calx of cobalt.

4. For the ſapphire : To 24 ounces of the Mayence baſe, add for colour two drams 46 grains of the calx of cobalt.

5. For the amethiſt : To 24 ounces of the Mayence baſe, add for colour four drams of prepared manganeſe and four grains of precipitate of Caſſius.

9. For the beril : To 24 ounces of the third baſe, add for colour 96 grains of glaſs of antimony and four grains of calx of cobalt.

7. For the black agate : To 24 ounces of either of the baſes, add two ounces of the mixture directed above in par. *f*.

8. For the opal : To an ounce of the third baſe, add for colour 10 grains of luna cornea, two grains of magnet, and 26 grains of abſorbent earth.

9. For the oriental topaz : To 24 ounces of the firſt or third baſe, add for colour five drams of glaſs of antimony.

10. For the topaz of Saxony: To 24 of the ſame baſe, add for colour ſix drams of the glaſs of antimony.

11. For the topaz of Braſil : To 24 ounces of the ſecond or third baſe, add for colour one ounce 24 grains of the glaſs of antimony and eight grains of precipitate of Caſſius.

12. For the hyacinth : To 24 ounces of the baſe made with rock-cryſtal, add for colour two drams 48 grains of glaſs of antimony.

13. For the oriental ruby : 1. To 16 ounces of the Mayence baſe, add for colour a mixture of two drams 48 grains of the precipitate of Caſſius, the ſame quantity of crocus Martis prepared in aquafortis, the ſame of golden ſulphur of antimony and of fuſible mangancſe, with the addition of two ounces of mineral cryſtal ; or, 2. To 20 ounces of the baſe made with flint, add half an ounce of fuſible manganeſe and two ounces of mineral cryſtal.

14. For the balaſs ruby : 1. To 16 ounces of the Mayence baſe, add the above colouring powder, but diminiſhed a fourth part ; or, 2. To 20 ounces of the baſe made with flints, add the ſame colouring powder but with a fourth leſs of the manganeſe.

The *factitious* gems are eaſily diſtinguiſhed from the *natural*, by their ſoftneſs and fuſibility ; by their ſolubility in acids ; by their cauſing only a ſingle refraction of the rays of light ; and, in many caſes, by their ſpecific gravity, which exceeds 2.76 in all precious gems of the firſt order, as the diamond, ruby, ſapphire, &c.

Imitation of Antique Gems. There has been at different times a method practiſed by particular perſons of taking the impreſſions and figures of antique gems, with their engravings, in glaſs of the colour of the original gem. This has always been eſteemed a very valuable method, and greatly prferable to the more ordinary ones of doing it on ſealing-wax or brimſtone : but, to the misfortune of the world, this art being a ſecret only in the hands of ſome particular perſons who got their bread by it, died with them, and every new artiſt was obliged to re-invent the method ; till at length Mr Homberg, having found it in great perfection, gave the whole proceſs to the world to be no more forgotten or loſt ; and ſince that time it has been very commonly practiſed in France, and ſometimes in other places.

Mr Homberg was favoured in his attempts with all the engraved gems of the king's cabinet ; and took ſuch elegant impreſſions, and made ſuch exact reſemblances of the originals, and that in glaſſes ſo artfully tinged to the colour of the gems themſelves, that the niceſt judges were deceived in them, and often took them for the true antique ſtones. Theſe counterfeit gems alſo ſerve, as well as the original ones, to make more copies from afterwards : ſo that there is no end of the numbers that may be made from one ; and there is this farther advantage, that the copy may be eaſily made perfect, though the original ſhould not be ſo, but ſhould have ſuſtained ſome damage from a blow or otherwiſe.

The great care in the operation is to take the impreſſion of the gem in a very fine earth, and to preſs down upon this a piece of proper glaſs, ſoftened or half melted at the fire, ſo that the figures of the impreſſion made in the earth may be nicely and perfectly expreſſed upon the glaſs. In general, the whole proceſs much reſembles that of the common founders. But when it is brought to the trial, there is found a number of difficulties which were not to be foreſeen, and which would not at all affect the common works of the founder. For this purpoſe, every earth will ſerve that is fine enough to receive the impreſſions, and tough enough not to crack in the drying : theſe all ſerve for their uſe, becauſe the metals which they caſt are of a nature incapable of mixing with earth, or receiving it into them, even if both are melted together ſo that the metal always eaſily and perfectly ſeparates itſelf from the mould ; but it is very difficult in theſe caſts of glaſs. They are compoſed of a matter which differs in nothing from that of the mould, but that it has been run into this form by the force of fire, and the other has not yet been ſo run, but is on any occaſion ready to be ſo run, and will mix itſelf inſeparably with the glaſs in a large fire : conſequently, if there be not great care uſed, as well in the choice of the glaſs as in the manner of uſing it, when the whole is finiſhed there will be found great difficulty in the ſeparating the glaſs from the mould, and often this cannot be done without wholly deſtroying the impreſſion.

All earths run more or leſs eaſily in the fire as they are more or leſs mixed with ſaline particles in their natural formation. As all ſalts make earths run into glaſs, and as it is neceſſary to uſe an earth on this occaſion for the making a mould, it being alſo neceſſary to the perfection of the experiment that this earth ſhould not melt or run, it is our buſineſs to ſearch out for this purpoſe ſome earth which naturally contains very little ſalt. Of all the ſpecies of earth which Mr Homberg examined on this occaſion, none proved ſo much diveſted of ſalts, or ſo fit for the purpoſe, as the common tripela, or Tripoli, uſed to poliſh glaſs and ſtones. Of this earth there are two common kinds ; the one reddiſh, and compoſed of ſeveral flakes or ſtrata ; the other yellowiſh, and of a ſimple ſtructure. Theſe are both to be had in the ſhops. The latter kind is from the Levant ; the former in found in England, France, and many other places. This tripela muſt be choſen ſoft and ſmooth to the touch, and not mixed with ſandy or other extraneous matter. The yellowiſh kind is the beſt of the two, and is commonly called *Venetian tripoli.* This receives the impreſſions very beautifully; and never mixes with the glaſs in the operation, which the red kind ſometimes does. Mr Homberg uſually employed both kinds at once in the following manner: firſt, powder a quantity of the red tripela in an iron mortar, and ſifting it through a fine ſieve ſet it by for uſe; then ſcrape with a knife a quantity of the yellow tripela into a ſort of powder, and afterwards rub it till very fine in a glaſs mortar with a glaſs peſtle. The finer this powder is, the finer will be the impreſſion, and the more accurately perfect the caſt. The artificer might naturally ſuppoſe, that the beſt method to obtain a perfect fine powder of this earth, would be by waſhing it in water; but he muſt be cautioned againſt this. There is naturally in this yellowiſh tripoli a ſort of unctuoſity, which when it is formed into a mould keeps its granules together, and gives the whole an unform gloſſy ſurface: now the waſhing the powder takes away this unctuoſity; and though it renders it much finer, it makes it leave a granulated ſurface, not this ſmooth one, in the mould; and this muſt render the ſurface of the caſt leſs ſmooth.

When the two tripelas are thus ſeparately powdered, the red kind muſt be mixed with ſo much water as will bring it to the conſiſtence of paſte, ſo that it may be moulded like a lump of dough between the fingers: this paſte muſt be put into a ſmall crucible of a flat ſhape, and about half an inch or a little more in depth, and of ſuch a breadth at the ſurface as is a little more than that of the ſtone whoſe impreſſion is to be taken. The crucible is to be nicely filled with this paſte lightly preſſed down into it, and the ſurface of the paſte muſt be ſtrewed over with the fine powder of the yellow tripela not wetted. When this is done, the ſtone, of which the impreſſion is to be taken, muſt be laid upon the ſurface, and preſſed evenly down into the paſte with a finger and thumb, ſo as to make it give a ſtrong and perfect impreſſion; the tripela is then to be preſſed nicely even to its ſides with the fingers, or with an ivory knife. The ſtone muſt be thus left a few moments, for the humidity of the paſte to moiſten the dry powder of the yellow tripela which is ſtrewed over it: then the ſtone is to be carefully raiſed by the point of a needle fixed in a handle of wood; and the crucible being then turned bottom upwards, it will fall out, and the impreſſion will remain very beautifully on the tripela.

If the ſides of the cavity have been injured in the falling out of the ſtone, they may be repaired; and the crucible muſt then be ſet, for the paſte to dry, in a place where it will not be incommoded by the duſt.

The red tripoli being the more common and the cheaper kind, is here made to fill the crucible only to ſave the other, which alone is the ſubſtance fit for taking the impreſſion. When the ſtone is taken out, it muſt be examined, to ſee whether any thing be lodged in any part of the engraving, becauſe if there be any of the tripela left there, there will certainly be ſo much wanting in the impreſſion. When the crucible and paſte are dry, a piece of glaſs muſt be choſen of a proper colour, and cut to a ſize proper for the figure; this muſt be laid over the mould, but in ſuch a manner that it does not touch the figures, otherwiſe it would ſpoil them. The crucible is then to be brought near the furnace by degrees, and gradually heated till it cannot be touched without burning the fingers; then it is to be placed in the furnace under a muffle, ſurrounded with charcoal. Several of theſe ſmall crucibles may be placed under one muffle; and when they are properly diſpoſed, the aperture of the muffle ſhould have a large piece of burning charcoal put to it, and then the operator is to watch the proceſs, and ſee when the glaſs begins to look bright: this is the ſignal of its being fit to receive the impreſſion. The crucible is then to be taken out of the fire; and the hot glaſs muſt be preſſed down upon the mould with an iron inſtrument, to make it receive the regular impreſſion: as ſoon as this is done, the crucible is to be ſet at the ſide of the furnace out of the way of the wind, that it may cool gradually without breaking. When it is cold, the glaſs is to be taken out, and it edges ſhould be grated round with pincers, which will prevent its flying afterwards, which is an accident that ſometimes happens when this caution has been omitted, eſpecially when the glaſs is naturally tender. The different coloured glaſſes are of different degrees of hardneſs, according to their compoſition; but the hardeſt to melt are always the beſt for this purpoſe, and this is known by a few trials.

If it be deſired to copy a ſtone in relief which is naturally in creux, or to take one in creux which is naturally in relief; there needs no more than to take an impreſſion firſt in wax or ſulphur, and to mould that upon the paſte of tripela inſtead of the ſtone itſelf: then proceeding in the manner before directed, the proceſs will have the deſired ſucceſs.

A more ſimple and eaſy method than the above, is by taking the caſts in gypſum, or Plaſter of Paris as it is commonly called. For this purpoſe, the gypſum muſt be finely pulveriſed, and then mixed with clear water to the conſiſtence of thick cream. This is poured upon the face of the gem or ſeal of which the impreſſion is wanted, and which muſt be previouſly moiſtened with oil to facilitate the ſeparation of the caſt; and in order to confine the liquid plaſter, it is only neceſſary to pin a ſlip of oiled paper round the ſides of the ſeal by way of a cap or rim. When the plaſter is dry, it is to be taken off, and ſet before the mouth of the furnace, in order to free it entirely from moiſture; when it is fit to be uſed as a matrix in the ſame way as that formed with the tripoli earths. Only no crucible or other receptacle is at all neceſſary; the caſts being formed like ſo many ſmall cakes half an inch thick, and thus put into the furnace with the bits of glaſs upon them. The glaſs, after coming to a proper heat, is preſſed down upon the mould with an iron ſpatula to receive the deſired impreſſion, the preſſure requiſite being more or leſs according to the ſize of the ſtone. This method has been long practiſed very ſucceſsfully, and with no ſmall emolument, by that ingenious ſeal-engraver Mr Deuchar of Edinburgh. The only reſpect in which it is inferior to the other more operoſe and expenſive methods, conſiſts in the chance of air-bubbles ariſing in pouring on the plaſter; which chance, however, is leſs in proportion to the fineneſs of the gypſum employed. When air-bubbles do occur, the caſts may be laid aſide, as it is ſo eaſy to replace them.

The application of paſtes to multiply and preſerve the impreſſions of camaieux and intaglios, is an object very intereſting to artiſts and to antiquaries, as well as to men of learning and taſte in the fine arts.

This art, though only lately reſtored to any degree of perfection, is of very conſiderable antiquity. The great prices which the ancients paid for the elegant gems engraved by the celebrated Greek artiſts, could not but early ſuggeſt to them the idea of multiplying their numbers, by taking off their impreſſions in wax, in ſulphur, in plaſter, or in clay; but more particularly in coloured glaſs, or that vitrified ſubſtance commonly called *paſte*.

As the impreſſions on paſte are durable, and imitate the colours and brilliancy of the original ſtones, they ſerve the ſame purpoſes as the gems themſelves. This art was therefore practiſed not only by the Greeks, but by all the nations who cultivated Grecian taſte.

Many of the fineſt gems of antiquity are now loſt, and their impreſſions are to be found only on ancient paſtes. Great therefore is the value of theſe paſtes. Numerous collections of them have been formed by the curious. Inſtances of this are found in the Florentine Muſæum, in Stoſch's work on ancient gems with inſcriptions, in Winckelmann's deſcription of Stoſch's cabinet, and in the noble collection of Mr Charles Townley in London.

The art of taking impreſſions of gems ſeem not to have been altogether loſt even in the Gothic ages; for Heraclius, who probably lived in the ninth century, and wrote a book *De coloribus et artibus Romanorum*, teaches in very plain though not elegant terms how to make them. Indeed, ſome of the few perſons who then poſſeſſed this art, taking advantage of the ignorance of the times, ſold paſtes for original gems. Thus the famous emerald of the abbey of Reichnaw near Conſtance, although a preſent made by Charlemain, is now found to be a piece of glaſs. And thus the celebrated emerald vaſe in the cathedral of Genoa is likewiſe found to be a paſte (A). The Genoeſe got this vaſe at the taking of Ceſarea in the year 1101 as an equivalent for a large ſum of money; nor was any impoſition then ſuſpected, for in the year 1319 they pawned it for 1200 marcs of gold.

But this ingenious art, revived indeed in Italy in the time of Laurence of Medici and Pope Leo X. was not cultivated in an extenſive manner till the beginning of the preſent century, when M. Homberg reſtored it, as already mentioned. In this he is ſaid to have been greatly aſſiſted and encouraged by the then duke of Orleans regent of France, who uſed to amuſe himſelf with that celebrated chemiſt in taking off impreſſions in paſte from the king of France's, from his own, and other collections of gems.

According to the French Encyclopediſts, M. Clachant the elder, an engraver of ſome note, who died at Paris in 1781, learned this art from his royal highneſs, to whoſe houſehold his father or he ſeems to have belonged. Madamoiſelle Feloix next cultivated this art, and it is believed ſtill carries it on. She had been taught by her father, who in quality of garçon de chambre to the regent had often aſſiſted in the laboratory of his maſter, where he acquired this knowledge. Her collection conſiſts of 1800 articles.

Baron Stoſch, a Pruſſian, who travelled over Europe in queſt of original engraved ſtones and impreſſions of ancient gems, for the elegant work which he publiſhed and Picart engraved (B), was well acquainted with this art. He had taught it to his ſervant Chriſtian Dehn, who ſettled at Rome, where he made and ſold his well known ſulphur impreſſions and paſtes. He had collected 2500 articles. Dolce has arranged them in a ſcientific order, and given a deſcriptive catalogue of them.

It was chiefly from Dehn's collection that the taſte for ſulphurs and paſtes has become ſo univerſal. They are great objects of ſtudy, and often require much learning to explain them. They have unqueſtionably ſerved to extend and improve the art of engraving on ſtones; and have been of infinite uſe to painters, to ſtatuaries, and to other artiſts, as well as to men of claſſical learning and fine taſte.

It is very difficult to take off impreſſions, and perfectly to imitate various coloured cameos. It cannot be properly done in wax, ſulphur, plaſter, or glaſs of one colour only. The difficulties ariſing from their ſize and form, and from the various nature of the different ſorts of glaſs, which do not well unite into different ſtrata, are very numerous: nor could the completeſt ſucceſs in this chemical and mechanical branch of the art produce a tolerable cameo. Impreſſions or imitations, if unaſſiſted by the tool of the engraver, do not ſucceed; becauſe the undercutting and deep work of moſt of the originals require to be filled up with clay or wax, that the moulds may come off ſafe without injuring them. Hence the impreſſions from theſe moulds come off hard and deſtitute of delicacy, ſharpneſs, and preciſion of outline, till the underworking of the moulder, is cut away. But Mr Reiffenſtein at Rome, by his genius, perſeverance, and the aſſiſtance of able artiſts, has overcome theſe difficulties; and has had the ſatisfaction of ſucceeding, and producing variegated cameos which can hardly be diſtinguiſhed from the originals.

Mr Lippart of Dreſden, an ingenious glazier, and an enthuſiaſt in the fine arts, practiſed this branch not unſucceſsfully; but not finding ſufficient encouragement for his paſtes of coloured glaſs, or perhaps from local difficulties in making them well and cheap, he abandoned this art. He ſubſtituted in its place impreſſions of fine white alabaſter or ſelenite plaſter. Such impreſſions, when carefully ſoaked in a ſolution of white Caſtile ſoap, then dried, and rubbed over with a ſoft bruſh, take a very agreeable poliſh. They ſhow the work perhaps to better advantage than red or white ſulphurs do; but they are not ſo durable, and are liable to be defaced by rubbing.

Of theſe impreſſions Mr Lippart publiſhed three different collections, each of them containing 1000 articles; and to the merit of having increaſed the number of Madamoiſelle Feloix and Chriſtiano Dehn's collections, which are all inſerted in his, he added that of employing two learned Germans to arrange and deſcribe them. The firſt thouſand were arranged and deſcribed by the late profeſſor Chriſt at Leipſic, and the ſecond and third thouſand by profeſſor Heine

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(A) See M. de la Condamine's Diſſ. in Memoir. de l'Acad. Roy. de Paris, 1757.

(B) Gemmæ antiquæ coloratæ, ſculptorum nominibus inſignitæ, re inciſæ, per Bernardum Picart. Amſtelodam. 1724, folio.

Heine at Goettingen. Nor did Mr Lippart ſtop here: but to make the ſtudy of antiquity more eaſy and acceptable to artiſts, he ſelected out of the whole collection of 3000, a ſmaller one of 2000 of the beſt and moſt inſtructive ſubjects, of which he himſelf drew up and publiſhed a deſcription in German.

But of all the artiſts and ingenious men who have taken impreſſions of engraved gems in ſulphhur and in paſte, no one ſeems to have carried that art to ſuch perfection as Mr James Taſſie, a native of Glaſgow but who has reſided in London ſince the year 1766. His knowledge in various branches of the fine arts, particularly in that of drawing, naturally led him to it. The elegant portraits which he models in wax, and afterwards moulds and caſts in paſte, which entirely reſemble cameos, are well known to the public.

Mr Taſſie, profiting of all the former publications of this ſort, and by expence, induſtry, and acceſs to many cabinets in England and other kingdoms to which former artiſts had not obtained admiſſion, has now increaſed his collection of impreſſions of ancient and modern gems to the number of above 15,000 articles. It is the greateſt collection of this kind that ever exiſted; and ſerves for all the purpoſes of artiſts, antiquaries, ſcholars, men of taſte, and even philoſophers. The great demand for his paſtes was perhaps owing in the beginning to the London jewellers, who introduced them into faſhion by ſetting them in rings, ſeals, bracelets, necklaces, and other trinkets.

The reputation of this collection having reached the empreſs of Ruſſia, ſhe was pleaſed to order a complete ſet; which being accordingly executed in the beſt and moſt durable manner, were arranged in elegant cabinets, and are now placed in the noble apartments of her imperial majeſty's ſuperb palace at Czarſk Zelo.

Mr Taſſie, in executing the commiſſion, availed himſelf of all the advantages which the improved ſtate of chemiſtry, the various ornamental arts, and the knowledge of the age, ſeemed to afford. The impreſſions were taken in a beautiful white enamel compoſition, which is not ſubject to ſhrink or form air-bladders; which emits fire when ſtruck with ſteel, and takes a fine poliſh; and which ſhows every ſtroke and touch of the artiſt in higher perfection than any other ſubſtance. When the colours, mixed colours, and nature of the reſpective originals, could be aſcertained, they were imitated as completely as art can imitate them; inſomuch that many of the paſte intaglios and cameos in this collection are ſuch faithful imitations, that artiſts themſelves have owned they could hardly be diſtinguiſhed from the originals. And when the colour and nature of the gems could not be authenticated, the paſtes were executed in agreeable, and chiefly tranſparent, colours; conſtant attention being beſtowed to preſerve the outlines, extremities, attributes, and inſcriptions.

It was the learned Mr Raſpe (from whom this account (c) is taken) who arranged this great collection, and made out the deſcriptive catalogue. His arrangement is nearly the ſame with that of the late Abbé Winkelmann, in his deſcription of the gems which belonged to Baron Stoſch. But as modern works were inſerted in this collection, he found it neceſſary to make a few alterations, and added ſome diviſions to thoſe of M. Winkelmann, as will appear from the following conſpectus, with which we ſhall conclude this detail.

I. Ancient Art and Engravings.
  - Egyptian. Hieroglyphics, ſacred animals, divinities, prieſts.
  - Baſilidian, Gnoſtic, and other taliſmans, &c.
  - Oriental and barbarous ancient and modern engravings.
  - Greek and Roman originals, copies, and imitations (the Etruſcan are claſſed with the Greek works.)
  - A, Mythology or fabulous age. Gods, inferior divinities, religious ceremonies.
  - B, Heroic age before the ſiege of Troy.
  - C, Siege of Troy.
  - D, Hiſtoric age. Of Carthage, Greece, Rome, ſubjects unknown.
  - E, Fabulous animals and chimeras.
  - F, Vaſes and urns.

II. Modern Art and Engravings.
  - A, Religious ſubjects.
  - B, Portraits of kings and ſovereigns.
  - C, Portraits of illuſtrious men in alphabetical order.
  - D, Portraits unknown.
  - E, Devices and emblems.
  - F, Cyphers, arms, ſupporters, and medley of modern hiſtory.

GEMARA, or GHEMARA, the ſecond part of the TALMUD.

The word גמרה, *gemara*, is commonly ſuppoſed to denote a ſupplement; but in ſtrictneſs it rather ſignifies complement, perfection: being formed of the Chaldee גמר, *gemar* or *ghemar*, “to finiſh, perfect, or complete any thing.”

The rabbins call the Pentateuch ſimply the *law*: the firſt part of the Talmud, which is only an explication of that law, or an application thereof to particular caſes, with the deciſions of the ancient rabbins thereon, they call the *Miſchna*, i. e. “ſecond law:” and the ſecond part, which is a more extenſive and ample explication of the ſame law, and a collection of deciſions of the rabbins poſterior to the Miſchna, they call *Gemara*, q.d. “perfection, completion, finiſhing;” becauſe they eſteem it the finiſhing of the law, or an explication beyond which there is nothing farther to be deſired.

The Gemara is uſually called ſimply *Talmud*, the common name of the whole work. In this ſenſe we ſay, there are two Gemaras or Talmuds; that of Jeruſalem and that of Babylon: though in ſtrictneſs the Gemara is only an explication of the Miſchna, given by the Jewiſh doctors in their ſchools; much as the commentaries of our ſchool-divines on St Thomas, or the maſter of the ſentences, are an explication of the writings of thoſe authors.

A commentary, Monſ. Tillemont obſerves, was wrote on the Miſchna, by one Jochanan, whom the Jews place about the end of the ſecond century: but Fa.

(c) Account of the preſent ſtate and arrangement of Mr James Taſſie's collection of paſtes and impreſſions from ancient and modern gems, by R. C. Raſpe, London, 1786, 8vo.

Morin proves, from the work itſelf, wherein mention is made of the Turks, that it was not wrote till the time of Heraclius, or about the year 620; and this is what is called the *Gemara*, or *Talmud of Jeruſalem*, which the Jews do not uſe or eſteem much becauſe of its obſcurity.

They ſet a much greater value on the Gemara, or Talmud of Babylon, begun by one Aſa; diſcontinued for 73 years, on occaſion of the wars with the Saracens and Perſians; and finiſhed by one Joſa, about the cloſe of the ſeventh century. See TALMUD.

Though the name Talmud, in its latitude, includes both the Miſchna and the two Gemaras, yet it is properly that of Aſa and Joſa alone which is meant under that name. This the Jews prize above all their other writings, and even ſet it on a level with ſcripture itſelf: in effect, they conceive it as the word of God, derived by tradition from Moſes, and preſerved without interruption to their time. R. Jehuda, and afterwards R. Johanan, R. Aſa, and R. Joſa, fearing the traditions ſhould be loſt in the diſperſion of the Jews, collected them into the Miſchna and the Gemara. See CARAITES and RABBINISTS.

GEMINI, in aſtronomy, the TWINS; a conſtellation or ſign of the zodiac, the third in order, repreſenting Caſtor and Pollux; and it is marked thus, ♊. The ſtars in the ſign Gemini, in Ptolemy's catalogue, are 25; in Tycho's, 25; in Hevelius's, 38; in the Britannic Catalogue, 85.

GEMINIANI, a celebrated muſician and compoſer, was born at Lucca in the year 1680. He received his firſt inſtructions in muſic from Aleſſandro Scarlatti; and after that became a pupil of Carlo Ambroſio Lunati, ſurnamed *Il Gobbo*, a moſt celebrated performer on the violin; after which he became a diſciple of Corelli, and under him finiſhed his ſtudies on that inſtrument. In the year 1714, he came to England; where in a ſhort time he ſo recommended himſelf by his exquiſite performance, that all who profeſſed to love and underſtand muſic were captivated with hearing him. Many of the nobility laid claim to the honour of being his patrons; but he ſeemed chiefly to attach himſelf to Baron Kilmanſegge, chamberlain to king George I. as elector of Hanover, and a favourite of that prince. In 1716, he publiſhed and dedicated to his patron 12 ſonatas *a violino violone e cembalo*: the firſt ſix with fugues and double ſtops as they are vulgarly called; the laſt with airs of various meaſures, ſuch as allemandes, courants, and jiggs. This publication was ſo well reliſhed by the baron, that he mentioned Geminiani to the king as an excellent performer; in conſequence of which our muſician had the honour to perform before his majeſty, in concert with the celebrated Handel, who played on the harpſichord. But though Geminiani was exceedingly admired, yet he had not a talent at aſſociating muſic with poetry, nor do we find that he ever became a public performer: he was therefore obliged to depend for his ſubſiſtence on the friendſhip of his patrons, and the profits which accrued to him from teaching. He had alſo the misfortune to be an enthuſiaſt in painting; and the verſatility of his temper was ſuch, that, in order to gratify this paſſion, he not only ſuſpended his ſtudies, and neglected to exerciſe his talents, but involved himſelf in debts. In 1727, he was offered the place of maſter and compoſer of the ſtate-muſic in Ireland; but this could not be conferred on a Catholic, and Geminiani refuſed to change his religion: upon which it was given to Matthew Dubourg, a young man who had been one of his pupils, and was a celebrated performer on the violin. Geminiani then ſet himſelf to compoſe parts to the *opera quinta* of Corelli; or, in other words, to make concertos of the firſt ſix of his ſolos. This work he completed, and, with the help of a ſubſcription, at the head of which were the names of the royal family, publiſhed in 1726. In 1732, he publiſhed his *opera ſeconda*, which contains a celebrated minuet that goes by his name. He publiſhed many other pieces, the profits of which did not much mend his circumſtances; but this perhaps was owing to his rambling diſpoſition and enthuſiaſtic fondneſs of painting. He was alſo an utter ſtranger to the buſineſs of an orcheſtra, and had no idea of the labour and pains neceſſary in the inſtruction of ſingers for the performance of muſic to which they were ſtrangers. The conſequence of this was, that a *concerto ſpirituale*, which he had advertiſed for his own benefit in 1748, failed in the performance. The audience, however, compaſſionated his diſtreſs, and ſat very ſilent till the books were changed; when the performance was continued with compoſitions of the author's own, and which he executed in ſuch a manner as was never forgot. The profits ariſing from this performance enabled him to take a journey to Paris; where he ſtaid long enough to get plates engraven for a ſcore of ſolos, and the parts of two operas of concertos. About the year 1755 he returned to England, and advertiſed them for ſale. In 1761, Geminiani went over to Ireland; and was kindly entertained there by Mr Matthew Dubourg, who had been his pupil, and was then maſter of the king's band in Ireland. This perſon through the courſe of his life had ever been diſpoſed to render him friendly offices; and it was but a ſhort time after Geminiani's arrival at Dublin that he was called upon to do him the laſt. It ſeems that Geminiani had ſpent many years in compiling an elaborate treatiſe on muſic, which he intended for publication; but ſoon after his arrival at Dublin, by the treachery of a female ſervant, who, it was ſaid, was recommended to him for no other end than that ſhe might ſteal it, it was conveyed away, and could not be recovered. The greatneſs of this loſs, and his inability to repair it, made a deep impreſſion on his mind; and, as is conjectured, haſtened his end; at leaſt he ſurvived it but a ſhort time, ending his days on the 17th of September 1762. The following liſt compriſes the whole of his publications, except two or three articles of ſmall account. Twelve ſolos for a violin, *opera prima*; ſix concertos in ſeven parts, *opera ſeconda*; ſix concertos in ſeven parts, *opera terza*; twelve ſolos for a violin, *opera quarta*; ſix ſolos for a violencello, *opera quinta*; the ſame made into ſolos for a violin; ſix concertos from his *opera quarta*; ſix concertos in eight parts, *opera ſettima*; rules for playing in taſte; a treatiſe on good taſte; the art of playing the violin, 12 ſonatas from his firſt ſolos, *opera undecima*; Ripieno parts to ditto; leſſons for the harpſichord; *Guida Armonica*; ſupplement to ditto; the art of accompaniment, two books; his firſt two operas of concertos in ſcore; and the enchanted foreſt.—Of his ſolos the *opera prima* is eſteemed the beſt. Of his concertos ſome are excellent, others of them ſcarce paſs the bounds of mediocrity. The ſixth of the third opera not only ſurpaſſes all the reſt, but, in the opinion of the beſt judges of harmony, is the fineſt inſtrumental compoſition extant.

GEMMA, or Bud, in botany; a compendium or epitome of a plant, ſeated upon the ſtem and branches, and covered with ſcales, in order to defend the tender rudiments incloſed from cold and other external injuries, till their parts being unfolded, they acquire ſtrength, and render any further protection unneceſſary.

Buds, together with bulbs, which are a ſpecies of buds generally ſeated upon or near the root, conſtitute that part of the herb called by Linnæus *hybernacula*; that is the winter-quarters of the future vegetable: a very proper appellation, as it is during that ſevere ſeaſon that the tender rudiments are protected in the manner juſt mentioned.

Plants conſidered in analogy to animals, may properly enough be reckoned both viviparous, and oviparous. Seeds are the vegetable eggs; buds, living fetuſes, or infant plants, which renew the ſpecies as certainly as the ſeed.

Buds are placed at the extremity of the young ſhoots, and along the branches, being fixed with a ſhort footſtalk upon a kind of brackets, the remainder of the leaves, in the wings or angles of which the buds in queſtion were formed the preceding year. They are ſometimes placed ſingle; ſometimes two by two, and thoſe either oppoſite or alternate; ſometimes collected in greater numbers in whirls or rings.

With reſpect to their conſtruction, buds are compoſed of ſeveral parts artificially arranged. Externally, we find a number of ſcales that are pretty hard, frequently armed with hairs, hollowed like a ſpoon, and placed over each other like tiles. Theſe ſcales are fixed into the inner plates of the bark, of which they appear to be a prolongation. Their uſe is to defend the internal parts of the bud; which being unfolded, will produce ſome flowers, leaves, and ſtipulæ; others, footſtalks and ſcales. All theſe parts, while they remain in the bud, are tender, delicate, folded over each other, and covered with a thick clammy juice, which is ſometimes reſinous and odoriferous, as in the tacamahac-tree. This juice ſerves not only to defend the more tender parts of the embryo-plant from cold, the aſſaults of inſects, and other external injuries; but likewiſe from exceſſive perſpiration, which, in its young and infant ſtate, would be very deſtructive. It is conſpicuous in the buds of horſe-cheſnut, poplar, and willow trees.

In general, we may diſtinguiſh three kinds of buds; that containing the flower, that containing the leaves, and that containing both flower and leaves.

The firſt, termed *gemma florifera*, and by the French *bouton a fleur* or *a fruit*, contains the rudiments of one or ſeveral flowers, folded over each other, and ſurrounded with ſcales. In ſeveral trees, this kind of bud is commonly found at the extremity of certain ſmall branches, which are ſhorter, rougher, and leſs garniſhed with leaves, than the reſt. The external ſcales of this ſpecies of bud are harder than the internal; both are furniſhed with hairs, and in general more ſwelled than thoſe of the ſecond ſort. The bud containing the flower too is commonly thicker, ſhorter, almoſt ſquare, leſs uniform, and leſs pointed; being generally terminated obtuſely. It is called by Pliny *oculus gemmæ*; and is employed in that ſpecies of grafting called *inoculation*, or *budding*.

The ſecond ſpecies of bud, *viz.* that containing the leaves, termed *gemma folifera*, and by the French *bouton a feuilles* or *a bois*, contains the rudiments of ſeveral leaves, which are variouſly folded over each other, and outwardly ſurrounded by ſcales, from which the ſmall ſtipulæ that are ſeated at the foot of the young branches are chiefly produced. Theſe buds are commonly more pointed than the former ſort. In the hazel-nut, however, they are perfectly round; and in horſe-cheſnut, very thick.

The third ſort of bud is ſmaller than either of the preceding; and produces both flowers and leaves, tho' not always in the ſame manner. Sometimes the flowers and leaves are unfolded at the ſame time. This mode of the flower and leaf bud is termed by Linnæus *gemma folifera & florifera*. Sometimes the leaves proceed or emerge out of this kind of bud upon a ſmall branch, which afterwards produces flowers. This mode of the flower and leaf bud is termed by Linnæus *gemma folifera-florifera*, and is the moſt common bud of any.

Such buds as produce branches adorned only with leaves are called *barren*; ſuch as contain both leaves and flowers, *fertile*. From the bulk of the bud we may often with eaſe foretel whether it contains leaves only, or leaves and flowers together, as in cherry and pear trees.

Neither the buds produced on or near the root, called by ſome authors *turiones*, nor thoſe produced on the trunk, and from the angles or wings of the leaves, contain, in ſtrict propriety, an entire delineation of the plant; ſince the roots are wanting; and in various buds, as we have ſeen, ſhoots are contained with leaves only, and not with flowers: but as a branch may be conſidered as a part ſimilar to the whole plant, and, if planted, would in proceſs of revegetation exhibit or produce roots and flowers, we may in general allow, that the bud contains the whole plant, or the principles of the whole plant, which may be unfolded *ad libitum*; and thus reſembles the ſeed in containing a delineation of the future plant in embryo: for although the bud wants a radicle, or plumula, of which the ſeed is poſſeſſed, yet it would undoubtedly form one, if planted in the earth. But as the medullary part adhering to the bud is too tender, and by the abundance of juice flowing into it from the earth would be diſpoſed to putrefaction, the buds are not planted in the ſoil, but generally inſerted within the bark of another tree; yet placed ſo that the production of the marrow, or pith, adhering to them, may be inſerted into the pith of the branch in which the fiſſure or cleft is made; by which means there is a large communication of juice. This propagation by gems or buds, called *inoculation*, is commonly practiſed with the firſt ſort of buds above deſcribed.

From the obvious uſes of the buds, we may collect the reaſon why the ſupreme Author of nature has granted this ſort of protection to moſt of the trees that are natives of cold climates: and, on the other hand, denied it to ſuch as, enjoying a warm benign atmoſphere, have not the tender parts of their embryo-ſhoots expoſed to injuries and depredations from the ſeverities of the weather. Of this latter kind are the plants of the following liſt; ſome of them very large trees; others ſmaller woody vegetables, of the ſhrub and under-ſhrub kind; Citron, orange, lemon, caſſava, mock-orange, blad-apple, ſhrubby ſwallow-wort, alaternus, ſhrubby geraniums, berry-bearing alder, Chriſt's-thorn. Syrian mallow, baobab or Ethiopian ſour-gourd, juſticia, mild ſena, the acacias and ſenſitive plant, coral-tree, ſtinking bean-trefoils, medicago, oleander, viburnum, ſumach, ivy, tamariſk, heath, Barbadoes cherry, lavatera, rue, ſhrubby nightſhades, Guinea henweed, cypreſs, lignum vitæ, and ſavine a ſpecies of juniper.

On annual plants, whoſe root as well as ſtalk periſhes after a year, true buds are never produced; in their ſtead, however, are protruded ſmall branches, like a little feather, from the wings of the leaves, which wither without any farther expanſion if the plants climb and have no lateral branches; but if, either by their own nature or from abundance of ſap, the plants become branched, the ramuli juſt mentioned obtain an increaſe ſimilar to that of the whole plant.

The ſame appearance obtains in the trees of warm countries, ſuch as thoſe enumerated in the above liſt, in which a plumula, or ſmall feather, ſends forth branches without a ſcaly covering; as, in ſuch countries, this tender part requires no defence or protection from cold. A ſcaly covering then is peculiar to buds, as it protects the tender embryo incloſed from all external injuries. When we therefore ſpeak of trees having buds that are naked or without ſcales, our meaning is the ſame as if we had ſaid that they have no buds at all.

The buds that are to be unfolded the following year, break forth from the evolved buds of the preſent year, in ſuch a manner as to put on the appearance of ſmall eminences in the wings or angles of the leaves. Theſe eminences or knots grow but little during the ſummer: as, in that ſeaſon, the ſap is expended on the increaſe of the parts of the plant: but in autumn, when the leaves begin to wither and fall off, the buds, placed on the wings, increaſe; and the embryo-plant contained in the bud is ſo expanded, that the leaves and flowers, the parts to be evolved the following year, are diſtinctly viſible. Thus in horſe-cheſnut the leaves, and in cornel-tree the flowers, are each to be obſerved in their reſpective buds.

As each bud contains the rudiments of a plant, and would, if ſeparated from its parent vegetable, become every way ſimilar to it; Linnæus, to ſhow the wonderful fertility of nature, has made a calculation, by which it appears, that, in a trunk ſcarce exceeding a ſpan in breadth, 10,000 buds (that is, herbs) may be produced. What an infinite number, then, of plants might be raiſed from a very large tree!

GEMMATIO, from *gemma*, "a bud;" a term uſed by Linnæus, expreſſive of the form of the buds, their origin, and their contents. It includes both thoſe properly called *buds*, and thoſe which are ſeated at the roots, ſtyled *bulbs*.

As to the origin of buds, they are formed either of the footſtalks of the leaves, of ſtipulæ, or of ſcales of the bark. Their contents have been already diſcovered, in the preceding article, to be either flowers, leaves, or both.

GEMONIÆ SCALÆ, or *Gradus Gemonii*, among the Romans, was much the ſame as gallows or gibbet in England.—Some ſay they were thus denominated from the perſon who raiſed them; others, from the firſt criminals that ſuffered on them; and others, from the verb *gemo*, "I ſigh or groan."

The *gradus gemonii*, according to Publius Victor or Sextus Rufus, was a place raiſed on ſeveral ſteps, from whence they precipitated their criminals; others repreſent it as a place whereon offenders were executed, and afterwards expoſed to public view. The *gemoniæ ſcalæ* were in the tenth region of the city, near the temple of Juno. Camillus firſt appropriated the place to this uſe, in the year of Rome 358.

GENDARMES, or GEN D'ARMES, in the French armies, a denomination given to a ſelect body of horſe, on account of their ſucceeding the ancient gendarmes, who were thus called from their being completely clothed in armour; (ſee *Scots* GENDARMES, *infra.*) Theſe troops were commanded by captain-lieutenants, the king and the princes of the blood being their captains: the king's troop, beſides a captain-lieutenant, has two ſublieutenants, three enſigns, and three guidons.

Grand GENDARMES, latterly were a troop compoſed of 250 gentlemen; the king himſelf was their captain, and one of the firſt peers their captain-lieutenant, who has under him two lieutenants, three enſigns, three guidons, and other officers.

Small GENDARMES, were the Scots gendarmes, the queen's, the dauphin's, the gendarmes of Anjou, Burgundy, the Engliſh and Flemiſh gendarmes, having each a captain-lieutenant, ſub-lieutenant, enſign, guidon, and quarter-maſter.

Scots GENDARMES, were originally inſtituted by Charles VII. of France, about the middle of the 5th century, and formed a part of his guard; in which ſtation alſo they acted under other princes. It was their prerogative to take precedence of all the companies of the gendarmerie of France; and, on particular occaſions, they even preceded the two companies of the king's mouſquetaires. The ſons of the Scottiſh monarchs were the uſual captains of this company; and after Mary's acceſſion to the throne, its command belonged to them as a right. It was thence that James VI. made a claim of it for his ſon prince Henry. This honour, and its emoluments, were alſo enjoyed by Charles I. and the next in command to this prince was Louis Stuart duke of Lennox. George Gordon marquis of Huntly ſucceeded the duke of Lennox in the year 1624, and took the title of captain or commander in chief when Charles I. mounted the Engliſh throne. It is not certain whether Charles II. was ever captain of this company; but it was conferred on his brother the duke of York, who was captain of the Scots gendarmes till the year 1667, when he reſigned his commiſſion into the hands of the French king. Since that time no native of Great Britain has enjoyed this command. See *Scots* GUARDS.

Stuart's Conſtit. of Scotland.

All the different gendarmeries are now aboliſhed, in conſequence of the reforming ſyſtems that have lately taken place in France.

GENDER, among grammarians, a diviſion of nouns, or names, to diſtinguiſh the two ſexes.

This was the original intention of gender: but afterwards other words, which had no proper relation either to the one ſex or the other, had genders aſſigned them, rather out of caprice than reaſon; which is at length eſtabliſhed by cuſtom. Hence genders vary according to the languages, or even according to the words introduced from one language into another. Thus, *arbor* in Latin is feminine, but *arbre* in French is maſculine; and *dens* in Latin is maſculine, but *dent* in French is feminine.

The oriental languages frequently neglect the uſe of genders, and the Perſian language has none at all.

The Latins, Greeks, &c. generally content themſelves to expreſs the different genders by different terminations; as *bonus equus*, "a good horſe;" *bona equa*, "a good mare," &c. But in Engliſh we frequently go further, and expreſs the difference of ſex by different words: as boar, ſow; boy, girl; buck, doe; bull, cow; cock, hen; dog, bitch, &c.—We have only about 24 feminines, diſtinguiſhed from the males, by the variation of the termination of the male into *eſs*; of which number are abbot, abbeſs; count, counteſs; actor, actreſs; heir, heireſs; prince, princeſs, &c. which is all that our language knows of any thing like genders.

The Greek and Latin, beſides the maſculine and feminine, have the neuter, common, and the doubtful gender; and likewiſe the epicene, or promiſcuous, which under one ſingle gender and termination includes both the kinds.

GENDRE (Louis le), an eſteemed hiſtorian, born at Roan. He became canon of Notre Dame at Paris, ſubchanter of the ſame church, and abbot of Notre Dame at Claire Fontaine in the dioceſe of Chartres. He wrote a great number of works; the principal of which are: 1. The Manners and Cuſtoms of the French, in the different times of that monarchy. 2. An Hiſtory of France, in three volumes folio, and in ſeven volumes duodecimo. 3. The life of Cardinal d'Amboiſe. He died in 1733, aged 78.

Gendre (Gilbert Charles le), marquis of St Aubin, counſellor in the parliament of Paris, and afterwards maſter of requeſts in the king's houſehold. He wrote ſeveral works; but is chiefly diſtinguiſhed by his *Traite de l'opinion*, 9 vols 12mo; a curious performance proving, by hiſtoric examples, the empire of opinion over the works of art and ſcience. He died at Paris in 1746, aged 59.

GENEALOGY, an enumeration of a ſeries of anceſtors; or a ſummary account of the relations and alliances of a perſon or family, both in the direct and collateral line.

The word is Greek γενεαλογια; which is formed of γενος, "race or lineage," and λογος, "diſcourſe."

In divers chapters and military orders, it is required that the candidates produce their genealogy, to ſhow that they are noble by ſo many deſcents.

GENEALOGICA ARBOR, or *Tree of Conſanguinity*, ſignifies a genealogy or lineage drawn out under the figure of a tree, with its root, ſtock, branches, &c. The genealogical degrees are uſually repreſented in circles, ranged over, under, and aſide each other. This the Greeks called *ſtemmata*, a word ſignifying crown, garland, or the like. See the articles Consanguinity and Descent, and the plates there referred to.

GENEP, a ſtrong town of Germany, in the circle of Weſtphalia, ſubject to the king of Pruſſia. E. Long. 4. 29. N. Lat. 51. 42.

GENERAL, an appellation given to whatever belongs to a whole genus.

General Aſſembly. See Assembly.

General Charge in law. See *Charge to enter Heir*.

General Terms, among logicians, thoſe which are made the ſigns of general ideas. See Logic and Metaphysics.

General Warrant. See Warrant.

General of an Army, in the art of War, he who commands in chief. See the article War, where his office and duties are particularly expained.

General of the Artillery. See Ordnance.

General of Horſe, and *General of Foot*, are poſts next under the general of the army, and theſe have upon all occaſion an abſolute authority over all the horſe and foot in the army.

Adjutant General, one who attends the general, aſſiſts in council, and carries the general's orders to the army. He diſtributes the daily orders to the majors of brigade. He is likewiſe charged with the general detail of the duty of the army. The major of brigade ſends every morning to the adjutant-general an exact return, by batallion and company, of the men of his brigade. In a day of battle the adjutant-general ſees the infantry drawn up; after which, he places himſelf by the general, to receive any orders which may regard the corps of which he has the detail. In a ſiege, he orders the number of workmen demanded, and ſigns the warrant for their payment. He receives the guards of the trenches at their rendezvous, and examines their condition; he gives and ſigns all orders for parties. He has an orderly ſerjeant from each brigade of infantry in the line, to carry ſuch orders as he may have occaſion to ſend from the general.

Lieutenant-General, is the next in command after the general; and provided he ſhould die or be killed, the order is, that the oldeſt lieutenant-general ſhall take the command. This office is the firſt military dignity after that of a general. One part of their function is, to aſſiſt the general with their counſel: they ought therefore, if poſſible, to poſſeſs the ſame qualities with the general himſelf; and the more, as they often command armies in chief.

The number of lieutenant-generals have been multiplied of late in Europe, in proportion as the armies have become numerous. They ſerve either in the field, or in ſieges, according to the dates of their commiſſions. In battle the oldeſt commands the right wing of the army, the ſecond the left wing, the third the centre; the fourth the right wing, of the ſecond line, the fifth the left wing, the ſixth the centre; and ſo on. In ſieges, the lieutenant-generals always command the right of the principal attack, and order what they judge proper for the advancement of the ſiege during the 24 hours they are in the trenches; except the attacks, which they are not to make without an order from the general in chief.

Lieutenant-General of the Ordnance. See Ordnance

Lieutenant-General of the Artillery, is, or ought to be, a very great mathematician, and an able engineer; to know all the powers of artillery; to underſtand the attack and defence of fortified places, in all its different

rent branches; how to diſpoſe of the artillery in the day of battle to the beſt advantage; to conduct its march and retreat; as alſo to be well acquainted with all the numerous apparatus belonging to the train, and to the laboratory, &c.

Major-General, the next officer to the lieutenant-general. His chief buſineſs is to receive orders from the general, or in his abſence from the lieutenant general of the day; which he is to diſtribute to the brigade-majors, with whom he is to regulate the guards, convoys, detachments, &c. On him the whole fatigue and detail of duty of the army roll. It is the major-general of the day who is charged with the encampment of the army, who places himſelf at the head of it when they march, who marks out the ground of the camp to the quarter maſter-general, and who places the new guards for the ſafety of the camp.

The day the army is to march, he dictates to the field-officers the order of the march, which he has received from the general, and on other days gives them the parole.

In a fixed camp he is charged with the foraging, with reconnoitring the ground for it, and poſting the eſcorts, &c.

In ſieges, if there are two ſeparate attacks, the ſecond belongs to him; but if there is but one, he takes, either from the right or left of the attack, that which the lieutenant-general has not choſen.

When the army is under arms, he aſſiſts the lieutenant-general, whoſe orders he executes.

If the army marches to an engagement, his poſt is at the head of the guards of the army, until they are near enough to the enemy to rejoin their different corps; after which he retires to his own proper poſt: for the major-generals are diſpoſed on the order of battle as the lieutenant-generals are; to whom, however, they are ſubordinate, for the command of their diviſions. The major-general has one aid-de-camp, paid for executing his orders.

General is alſo uſed for a particular march, or beat of drum; being the firſt which gives notice, commonly in the morning early, for the infantry to be in readineſs to march.

General is likewiſe an appellation by which officers in law, in the revenues, &c. are diſtinguiſhed; as, *attorney-general, ſolicitor-general*, &c. *receiver-general, comptroller-general*, &c. See Attorney, &c.

General is alſo uſed for the chief of an order of monks; or of all the houſes and congregations eſtabliſhed under the ſame rule. Thus we ſay, the general of the Franciſcans, Ciſtertians, &c.

GENERALISSIMO, called alſo *captain-general*, and ſimply *general*, is an officer who commands all the military powers of a nation; who gives orders to all the other general officers, and receives no orders himſelf but from the king.

Monſ. Balzac obſerves, that the cardinal de Richelieu firſt coined this word, of his own abſolute authority, upon his going to command the French army in Italy.

GENERATE, in muſic, is uſed to ſignify the operation of that mechanical power in nature, which every ſound has in producing one or more different ſounds. Thus any given ſound, however ſimple, produces along with itſelf, its octave, and two other ſounds extremely ſharp, viz. its twelfth above, that is to ſay, the octave of its fifth; and the other the ſeventeenth above, or in other words, the double octave of its third major.

Whether we ſuppoſe this procreation of ſounds to reſult from an aptitude in the texture and magnitude of certain particles in the air, for conveying to our ears vibrations that bear thoſe proportions one to another, as being determined at once by the partial and totall oſcillations of any muſical ſtring: or from whatever eoconomy of nature we chooſe to trace it; the power of one ſound thus to produce another, when in action, is ſaid to *generate*. The ſame word is applied, by Signior Tartini and his followers, to any two ſounds which, ſimultaneouſly heard, produce a third.

GENERATED, or Genited, is uſed, by ſome mathematical writers, for whatever is produced, either in arithmetic, by the multiplication, diviſion, or extraction of roots; or in geometry, by the invention of the contents, areas, and ſides; or of extreme and mean proportionals, without arithmetical addition and ſubtraction.

GENERATING line, or figure, in geometry, is that which, by its motion of revolution, produces any other figure, plane or ſolid. See Genesis.

GENERATION, in phyſiology, the act of procreating and producing a being ſimilar to the parent. See Anatomy, n° 109, 110.

Generation of Fiſhes. See *Comparative Anatomy*, nº 154. and Ichthyology.

Generation of Plants. See Botany, ſect. v.

Generation of Inſects. See *Comparative Anatomy*, p. 274. and Entomology, ſect. ii.

Parts of Generation. See Anatomy, n° 107, 108.

Generation, in mathematics, is uſed for formation or production. Thus we meet with the generation of equations, curves, ſolids, &c.

Generation, in theology. The Father is ſaid by ſome divines to have produced his Word or Son from all eternity, by way of generation; on which occaſion the word *generation* raiſes a peculiar idea; that proceſſion, which is really effected in the way of underſtanding, is called *generation*, becauſe in virtue thereof, the Word becomes like to him from whom he takes this original; or as St Paul expreſſes it, is the figure or image of his ſubſtance, *i. e.* of his being and nature. And hence it is, they ſay, that the ſecond Perſon in the Trinity is called the Son.

Generation is alſo uſed, though ſomewhat improperly, for genealogy, or the ſeries of children iſſued from the ſame ſtock. That the goſpel of St Matthew commmences from the book of the generation of Jeſus Chriſt, &c. The latter and more accurate tranſlators, inſtead of *generation* uſe the word *genealogy*.

Generation is alſo uſed to ſignify a people, race, or nation, eſpecially in the literal tranſlations of the ſcripture, where the word generally occurs wherever the Latin has *Generatio*, and the Greek γενεσις. Thus, "A wicked and perverſe generation ſeeketh a ſign," &c. "One generation paſſes away, and another cometh," &c.

Generation is alſo uſed in the ſenſe of an age, or the ordinary period of man's life. Thus we ſay, "to the third and fourth generation." In this ſenſe hiſtorians uſually reckon a generation the ſpace of 33 years or thereabouts. See Age.

Herodotus makes three generations in an hundred years; which computation appears from the later authors of political arithmetic to be pretty juſt.

GENERATOR, in muſic, ſignifies the principal ſound or ſounds by which others are produced. Thus the loweſt C for the treble of the harpſichord, beſides its octave, will ſtrike an attentive ear with its twelfth above, or G in alt, and with its ſeventeenth above, or E in alt. The C, therefore, is called their *generator*, the G and E its products or harmonics. But in the approximation of chords, for G, its octave below is ſubſtituted, which conſtitutes a fifth from the generator, or loweſt C; and for E, is likewiſe ſubſtituted its fifteenth below, which, with the abovementioned C, forms a third major. To the loweſt notes, therefore, exchanged for theſe in alt by ſubſtitution, the denominations of products or harmonics are likewiſe given, whilſt the C retains the name of their *generator*. But ſtill according to the ſyſtem of Tartini, two notes in concord, which when ſounded produce a third, may be termed the *concurring generators* of that third. (See *Generation Harmonique, par M. Rameau*; ſee alſo that delineation of Tartini's ſyſtem called *The power and principles of harmony.)*

GENERICAL NAME, in natural hiſtory, the word uſed to ſignify all the ſpecies of natural bodies, which agree in certain eſſential and peculiar characters, and therefore all of the ſame family or kind; ſo that the word uſed as the generical name equally expreſſes every one of them, and ſome other words expreſſive of the peculiar qualities or figures of each are added, in order to denote them ſingly, and make up what is called the ſpecific name. See BOTANY and ZOOLOGY.

GENESIS, the firſt book of the Old Teſtament, containing the hiſtory of the creation, and the lives of the firſt patriarchs.

The book of Geneſis ſtands at the head of the Pentateuch. Its author is held to be Moſes: it contains the relation of 2369 years, viz. from the beginning of the world to the death of Joſeph. The Jews are forbidden to read the beginning of Geneſis, and the beginning of Ezekiel, before 30 years of age.

The Hebrews called this book *Bereſchith*, becauſe it begins with that word, which in their language ſignifies *in principio*, or "in the beginning." The Greeks gave it the name *Geneſis*, Γενεσις, *q. d.* production, generation, becauſe it begins with the hiſtory of the production or generation of all beings.

This book, beſides the hiſtory of the creation, contains an account of the original innocence and fall of man; the propagation of mankind; the riſe of religion; the general defection and corruption of the world; the deluge; the reſtoration of the world; the diviſion and peopling of the earth; and the hiſtory of the firſt patriarchs to the death of Joſeph. It was eaſy for Moſes to be ſatisfied of the truth of what he delivers in this book, becauſe it came down to him thro' a few hands: for from Adam to Noah there was one man, viz. Methuſelah, who lived ſo long as to ſee them both: in like manner Shem converſed with Noah and Abraham; Iſaac with Abraham and Joſeph, from whom the records of this book might eaſily be conveyed to Moſes by Amram, who was contemporary with Joſeph.

GENESIS, in geometry, denotes the formation of a line, plane, or ſolid, by the motion or flux of a point, line, or ſurface. See FLUXIONS.

The geneſis or formation, *e. gr.* of a globe or ſphere, is conceived by ſuppoſing a ſemicircle to revolve upon a right line, drawn from one extreme thereof to the other, called its axis, or axis of circumvolution: the motion or revolution of that ſemicircle is the geneſis of the ſphere, &c.

In the geneſis of figures, &c. the line or ſurface that moves is called the *deſcribent*; and the line round which, or, according to which, the revolution or motion is made, the *dirigent*.

GENET, GENNET, or *Jennet*, in the manege, denotes a ſmall-ſized well-proportioned Spaniſh horſe.

To ride *a la genette*, is to ride after the Spaniſh faſhion, ſo ſhort, that the ſpurs bear upon the horſes flank.

GENETHLIA, in antiquity, a ſolemnity kept in memory of ſome perſon deceaſed.

GENETHLIACI, in aſtrology, perſons who erect horoſcopes or pretend to foretel what ſhall befal a man by means of the ſtars which preſided at his nativity. The word is formed of the Greek γενεθλη, *origin, generation, nativity.*

The ancients called them *Chaldæi*, and by the general name *mathematici*: accordingly, the ſeveral civil and canon laws, which we find made againſt the mathematicians, only reſpect the *genethliaci* or aſtrologers.

They were expelled Rome by a formal decree of the ſenate; and yet found ſo much protection from the credulity of the people, that they remained therein unmoleſted. Hence an ancient author ſpeaks of them as *hominum genus, quod in civitate noſtra ſemper & vetabitur, & retinebitur.*

GENETTE, in zoology. See VIVERRA.

GENEVA, a city of Switzerland, on the confines of France and Savoy, ſituated in 6° E. Long. and 46° 12′ 9″ N. Lat. It ſtands on the banks of the river Rhone, juſt at the place where the latter iſſues from the lake which takes its name from the city; and part of it is built on an iſland in the river. It is handſome, well fortified, and pretty large; the ſtreets in general are clean and well paved, but the principal one is encumbered with a row of ſhops on each ſide between the carriage and foot-paths. The latter is very wide, and protected from the weather by great wooden penthouſes projecting from the roofs; which, though very convenient, give the ſtreet a dark and dull appearance. The houſes are generally conſtructed of freeſtone, with baſements of limeſtone; the gutters, ſpouts, ridges, and outward ornaments, being made of tinned iron. Some of them have arched walks or piazzas in front. The place called *Treille* is very agreeable, being planted with linden trees, and commanding a fine proſpect of the lake, with ſeveral ranges of rocks riſing behind one another, ſome covered with vineyards and herbage, and others with ſnow, having openings between them. Immediately below Geneva the Rhone is joined by the Arve, a cold and muddy ſtream riſing among the Alps, and deriving a conſiderable part of its waters from the Glaciers. The Rhone is quite clear and tranſparent, ſo that the muddy water of the Arve is diſtinguiſhed from it even after they have flowed for ſeveral miles together. There are four bridges over the Rhone before it joins the Arve; and from it the city is ſupplied with water by means of an hydraulic machine, which raiſes it 100 Paris feet above its level. The principal buildings are, 1. The Maiſon de Ville, or town-houſe, a plain ancient edifice, with large rooms, in which the councils aſſemble, and public entertainments are held; and in one of them a weekly concert is held by ſubſcription during the winter. The aſcent to the upper ſtory is not by ſteps but a paved aclivity; which however, is ſo gentle, that horſes and mules can go up to the top. 2. The church of St Peter, formerly the cathedral, is an ancient Gothic building, with a modern portico of ſeven large Corinthian columns of red and white marble from Roche. The only thing remarkable in the inſide is the tomb of Henry duke of Rohan. 3. The arſenal is in good order, and ſupplied with arms ſufficient for 12,000 men. There are many ancient ſuits of armour; and the ſcaling ladders, lanthorns, hatchets, &c. uſed by the Savoyards in their treacherous attempt on the city in the year 1602, to be afterwards noticed, are here preſerved. The magazines contain 110 cannons beſides mortars. 4. The hoſpital is a large handſome building, by which and other charities near 4000 poor people are maintained. 5. The fortifications on the ſide of Savoy are of the modern conſtruction, but are commanded by ſome neighbouring grounds. On the ſide of France they are old faſhioned, and at any rate are rather calculated to prevent a ſurpriſe than to ſuſtain a regular ſiege. There are three gates, towards France, Savoy and Switzerland; and the acceſs to the lake is guarded by a double jetty and chain.

The territory belonging to this city contains about ſeven ſquare leagues, and is divided into nine pariſhes; the town is by far the moſt populous in Switzerland, having about 30,000 inhabitants, of whom, however, 5000 are generally ſuppoſed to be abſent. It has a ſmall diſtrict dependent upon it, but this does not contain above 16,000. The adjacent country is extremely beautiful, and has many magnificent views ariſing from the different poſitions of the numerous hills and mountains with regard to the town and lake. The inhabitants were formerly diſtinguiſhed into four claſſes, viz. citizens, burgeſſes, inhabitants, and natives; and ſince the revolution in 1782, a fifth claſs, named *domiciliis*, have been added, who annually receive permiſſion from the magiſtrates to reſide in the city. The citizens and burgeſſes alone, however, are admitted to a ſhare in the government; thoſe called *inhabitants* are ſtrangers allowed to ſettle in the town with certain privileges; and *natives* are the ſons of thoſe inhabitants, who poſſeſs additional advantages. The people are very active and induſtrious, carrying on an extenſive commerce.

1
State of learning in Geneva.

This city is remarkable for the number of learned men it has produced. The reformed doctrines of religion were very early received in it, being preached there in 1533 by William Farel and Peter Viret of Orbe, and afterwards finally eſtabliſhed by the celebrated John Calvin. Of this reformer Voltaire obſerves that he gave his name to the religious doctrines firſt broached by others, in the ſame manner that Americus Veſputius gave name to the continent of America which had formerly been diſcovered by Columbus. It was by the aſſiduity of this celebrated reformer, and the influence that he acquired among the citizens, that a public academy was firſt eſtabliſhed in the city, where he, Theodore Beza, and ſome of the more eminent firſt reformers, read lectures with uncommon ſucceſs. The intolerant ſpirit of Calvin is well known; but little of it now appears in the government of Geneva: on the contrary it is the moſt tolerating of all the States in Switzerland, being the only one of them which permits the public exerciſe of the Lutheran religion. The advantages of the academy at Geneva are very conſpicuous among the citizens at this day, even the lower claſs of them being exceedingly well informed; ſo that, according to Mr Coxe, there is not a city in Europe where learning is ſo generally diffuſed. "I received great ſatisfaction (ſays he) in converſing even with ſeveral tradeſmen upon topics both of literature and politics; and was aſtoniſhed to find in this claſs of men ſo uncommon a ſhare of knowledge; but the wonder ceaſes when we are told that all of them were educated at the public academy." In this ſeminary the induſtry and emulation of the ſtudents are excited by the annual diſtribution of prizes to thoſe who diſtinguiſh themſelves in each claſs. The prizes conſiſt of ſmall medals, but are conferred with ſuch ſolemnity as cannot fail to produce a ſtriking effect on the minds of youth. There is alſo a public library to which the citizens have acceſs, and which undoubtedly tends greatly to that univerſal diffuſion of learning ſo remarkable among the inhabitants. It was founded by Bonnivard, remarkable for his ſufferings in the cauſe of the liberties of his country. Having been a great antagoniſt of the dukes of Savoy, againſt whom he aſſerted the independence of Geneva, he had the misfortune at laſt to be taken priſoner, and was impriſoned for ſix years in a dungeon below the level of the lake, in the caſtle of Chillon, which ſtands on a rock in the lake, and is connected with the land by a drawbridge. In 1536 this caſtle was taken from Charles III. of Savoy by the canton of Berne, aſſiſted by the Genevans, who furniſhed a frigate (their whole naval force) to beſiege it by ſea. Bonnivard was now taken from his dungeon, where by conſtant walking backwards and forward, his only amuſement, he had worn a hollow in the floor which conſiſted of ſolid rock. Bonnivard conſidered the hardſhips he had endured as ties which endeared him to the city, and became a principal promoter of the reformation by the mild methods of perſuaſion and inſtruction. He cloſed his benefactions by the gift of his books and manuſcripts, and bequeathing his fortune towards the eſtabliſhment and ſupport of the ſeminary. His works, which chiefly relate to the hiſtory of Geneva, are ſtill preſerved with great care and reverence. The library contains 25,000 volumes, with many curious manuſcripts, of which an account has been publiſhed by the reverend H. Sennebier the librarian, who has likewiſe diſtinguiſhed himſelf by ſeveral literary works. Meſſrs Bonnet, Sauſſure, Mallet, and de Luc are the other moſt diſtinguiſhed literary geniuſes of which Geneva can boaſt. The laſt is particularly remarkable for the perfection to which he has brought the barometer, and which is now ſo great, that very little ſeems poſſible to be done by any body elſe. His cabinet merits the attention of naturaliſts, as containing many rare and curious ſpecimens of foſſils, which ſerve to illuſtrate the theory of the globe. It

2
Account of de Luc's cabinet.

It may be divided into three parts: 1. Such as enable the naturaliſt to compare the petrefactions of animals and vegetables with the ſame bodies which are ſtill known to exiſt in our parts of the globe. 2. The compare theſe petrefactions of animals with the ſame bodies which are known to exiſt in different countries. 3. To conſider the petrefactions of thoſe bodies which are no longer known to exiſt. The ſecond part comprehends the ſtones under three points of view: 1. Thoſe of the primitive mountains, which contain no animal bodies; 2. Thoſe of the ſecondary mountains, which contain only marine bodies; 3. Thoſe which contain terreſtrial bodies. The third part contains the lavas and other volcanic productions; which are diſtinguiſhed into two claſſes: 1. Thoſe which come from volcanoes now actually burning; 2. Thoſe from extinguiſhed volcanoes.

3
Hiſtory and government of Geneva.

In the time of Charles the Great, the city and territory of Geneva made part of his empire; and, under his ſucceſſors, it became ſubject to the German emperors. By reaſon of the imbecility of theſe princes however, the biſhops of Geneva acquired ſuch authority over the inhabitants, that the emperor had no other means of counterbalancing it than by augmenting the privileges of the people. In theſe barbarous ages alſo the biſhops and counts had conſtant diſputes, of which the people took the advantage; and by ſiding ſometimes with one, and ſometimes with the other, they obtained an extenſion of their privileges from both. The houſe of Savoy at length purchaſed the terrritory, and ſucceeded the counts with additional power: againſt them therefore the biſhops and people united in order to reſiſt their encroachments; and, during this period, the government was ſtrangely complicated by reaſon of the various pretenſions of the three parties. The counts of Savoy, however, had at laſt the addreſs to diſſolve the union between the biſhops and citizens, by procuring the epiſcopal ſee for their brothers, and even their illegitimate children; by which means their power became gradually ſo extenſive, that towards the commencement of the 16th century, Charles III. of Savoy (though the government was accounted entirely republican) obtained an almoſt abſolute authority over the people, and exerciſed it in a moſt unjuſt and arbitrary manner. Thus violent commotions took place; and the citizens became divided into two parties, one of which, viz. the patriots, were ſtyled *Eidgenoſſen* or *confederates*; the partiſans of Savoy being diſgraced by the appellation of *Mammelucs* or *ſlaves*. The true period of Genevan liberty may therefore be conſidered as commencing with the treaty concluded with Berne and Friburg in the year 1526; in conſequence of which the duke was in a ſhort time deprived of his authority, the biſhop driven from the city, and the reformed religion and a republican form of government introduced. A long war commenced with Savoy on this account: but the Genevans proved an overmatch for their enemies by their own bravery and the aſſiſtance of the inhabitants of Berne. In 1584, the republic concluded a treaty with Zurich and Berne, by which it is allied to the Swiſs cantons. The houſe of Savoy made their laſt attempt againſt Geneva in 1602, when the city was treacherouſly attacked in the night-time during a profound peace. Two hundred ſoldiers had ſcaled the walls, and got into the town before any alarm was given; but they were repulſed by the deſperate valour of a few citizens, who periſhed in the encounter. A petard had been faſtened to one of the gates by the Savoyards; but the gunner was killed before it could be diſcharged. The war occaſioned by this treachery was next year concluded by a ſolemn treaty, which has ever ſince been obſerved on both ſides; though the independence of Geneva was not formally acknowledged by the king of Sardinia till the year 1754.

The reſtoration of tranquillity from without in conſequence of the above treaty, was however ſoon followed by the flames of internal diſcord, ſo common in popular governments; ſo that during the whole of the laſt century the hiſtory of Geneva affords little more than an account of the ſtruggles betwixt the ariſtocratical and popular parties. About the beginning of the preſent century the power of the Grand Council was become almoſt abſolute; but in order to reſtrain its authority, an edict was procured in 1707 by the popular party, enacting, that every five years a general council of the citizens and burghers ſhould be ſummoned to deliberate upon the affairs of the republic. In conſequence of this law a general aſſembly was convened in 1712; and the very firſt act of that aſſembly was to aboliſh the edict by which they had been convened. A proceeding ſo extraordinary can ſcarcely be accounted for on the principles of popular fickleneſs and inconſtancy. Rouſſeau, in his Miſcellaneous Works, aſcribes it to the artifices of the magiſtrates, and the equivocal terms marked upon the billets then in uſe. For the queſtion being put, "Whether the opinion of the councils for aboliſhing the periodical aſſemblies ſhould paſs into a law," the words *approbation* or *rejection*, put upon the billets by which the votes were given, might be interpreted either way. Thus, if the billet was choſen on which the word *approbation* was written, the opinion of the councils which rejected the aſſembles was approved; and by the word *rejection*, the periodical aſſembly was rejected of courſe. Hence ſeveral of the citizens complained that they had been deceived, and that they never meant to reject the general aſſembly, but only the opinion of the councils.

4
Sketch of the government in 1776.

In conſequence of the abolition of the general aſſemblies the power of the ariſtocratical party was greatly augmented; till at length the inhabitants exerting themſelves with uncommon ſpirit and perſeverance, found means to limit the power of the magiſtrates, and enlarge their own rights. In 1776, as Mr Coxe informs us, the government might be conſidered as a mean betwixt that of the ariſtocratical and popular cantons of Switzerland. The members of the ſenate, or little council of 25, enjoyed in their corporate capacity ſeveral very conſiderable prerogatives. By them half the members of the great council were named; the principal magiſtrates were ſupplied from their own body; they convoked the great and general councils, deliberating previouſly upon every queſtion which was to be brought before theſe councils. They were veſted alſo with the chief executive power, the adminiſtration of finances, and had in a certain degree the juriſdiction in civil and criminal cauſes. Moſt of the ſmaller poſts were likewiſe filled by them; and they enjoyed the ſole privilege of conferring the burgherſhip. Theſe, and other prerogatives, however, were balanced by thoſe of the great council and the privileges of the general council. The former had a right to chooſe the members of the ſenate from their own body; receiving appeals in all cauſes above a certain value, pardoning criminals, &c. beſides which they had the important privilege of approving or rejecting whatever was propoſed by the ſenate to be laid before the people.

The general council or aſſembly of the people, is compoſed of the citizens and burghers of the town; their number in general amounting to 1500, though uſually not more than 1200 were preſent; the remainder reſiding in foreign countries, or being otherwiſe abſent. It meets twice a-year, chooſes the principal magiſtrates, approves or rejects the laws and regulations propoſe by the other councils, impoſes taxes, contracts alliances, declares war or peace, and nominates half the members of the great council, &c. But the principal check to the power of the ſenate aroſe from the right of *re-election*, or the power of annually expelling four members from the ſenate at the nomination of the *ſyndics* or principal magiſtrates, and from the right of repreſentation. The ſyndics are four in number, choſen annually from the ſenate by the general council; and three years elapſe before the ſame members can again be appointed. In chooſing theſe magiſtrates, the ſenate appointed from its own body eight candidates, from whom the four ſyndics were to be choſen by the general council. The latter, however, had it in their power to reject not only the firſt eight candidates, but alſo the whole body of ſenators in ſucceſſion: in which caſe, four members of the ſenate retired into the great council; and their places were filled by an equal number from that council. With regard to the power of repreſentation, every citizen or burgher had the privilege of applying to the ſenate in order to procure a new regulation in this reſpect, or of remonſtrating againſt any act of the magiſtracy. To theſe remonſtrances the magiſtrates were obliged to give an explicit anſwer; for if a ſatisfactory anſwer was not given to one, a ſecond was immediately preſented. The repreſentation was made by a greater or ſmaller number of citizens according to the importance of the point in queſtion.

5
Account of the revolution in 1782.

Since the 1776, however, ſeveral changes have taken place. This right of *re-election*, which the ariſtocratical party were obliged to yield to the people in 1768, ſoon proved very diſagreeable, being conſidered by the former as a kind of oſtraciſm; for which reaſon they catched at every opportunity of procuring its abolition. They were now diſtinguiſhed by the title of *negatives*, while the popular party had that of *repreſentants*; and the point in diſpute was the compilation of a new code of laws. This meaſure the negatives oppoſed, as ſuppoſing that it would tend to reduce their prerogative; while, on the other hand, the repreſentants uſed their utmoſt endeavours to promote it, in hopes of having their privileges augmented by this means. At laſt, in the month of January 1777, the negatives were obliged to comply with the demands of their antagoniſts; and a committee for forming a new code of laws was appointed by the concurrence of the little, great, and general councils. The committee was to laſt for two years, and the code to be laid before the three councils for their joint approbation or rejection. A ſketch of the firſt part of the code was preſented to the little and great councils on the firſt of September 1779, that they might profit by their obſervations before it was preſented to the general council. Great diſputes aroſe; and at length it was carried by the negatives that the code ſhould be rejected and the committee diſſolved. The oppoſite party complained of this as unconſtitutional, and violent diſputes enſued; the iſſue of which was, that the great council offered to compile the code, and ſubmit it to the deciſion of the public. This did not give ſatisfaction to the popular party, who conſidered it as inſidious: the contentions revived with more fury than ever, until at length the negatives ſuppoſing, or pretending to ſuppoſe, that their country was in danger, applied to their guarantees, France, Zurich, and Berne, intreating them to protect the laws and conſtitution. This was productive of no good effect; ſo that the negatives found no other method of gaining their point than by ſowing diſſenſion among the different claſſes of inhabitants. The *natives* were diſcontented and jealous on account of many excluſive privileges enjoyed by that claſs named *citizens*: they were beſides exaſperated againſt them for having, in 1773, baniſhed eight of the principal natives, who pretended that the right of burgherſhip belonged to the natives as well as to the citizens, and demanded that this right ought to be gratuitouſly conferred inſtead of being purchaſed. The negatives, in hopes of making ſuch a conſiderable addition to their party, courted the natives by all the methods they could think of, promiſing by a public declaration that they were ready to confer upon them thoſe privileges of trade and commerce which had hitherto been confined excluſively to the citizens. The deſigns of the negatives were likewiſe openly favoured by the court of France, and diſpatches were even written to the French reſident at Geneva to be communicated to the principal natives who ſided with the ariſtocratic party. The attorney-general, conceiving this mode of interference to be highly unconſtitutional, preſented a ſpirited remonſtrance; by which the French court were ſo much diſpleaſed that they procured his depoſition from his office; and thus their party was very conſiderably increaſed among the natives. The repreſentants were by no means negligent in their endeavours to conciliate the favour of the ſame party, and even promiſed what they had hitherto oppoſed in the ſtrongeſt manner, viz. to facilitate the acquiſition of burgherſhip, and to beſtow it as the recompence of induſtry and good behaviour. Thus two parties were formed among the natives themſelves; and the diſſenſions becoming every day worſe and worſe, a general inſurrection took place on the 5th of February 1781. A diſpute, accompanied with violent reproaches, having commenced betwixt two neighbouring and oppoſite parties of natives, a battle would have immediately taken place, had it not been for the interpoſition of the ſyndics on the one ſide, and the chiefs of the repreſentants on the other. The tumult was beginning to ſubſide, when a diſcharge of muſquetry was heard from the arſenal. Some young men who ſided with the negatives, having taken poſſeſſion of the arſenal, had fired by miſtake upon ſeveral natives of their own party, and had killed one and wounded another. This was conſidered by the repreſentants as the ſignal for a general inſurrection, on which they inſtantly took up arms and marched in three columns to the arſenal; but finding there only a few young men who had raſhly fired without orders, they permitted the reſt to retire without moleſtation. In the opinion of ſome people, however, this affair was preconcerted, and the repreſentants are ſaid to have been the firſt aggreſſors.

The repreſentants having thus taken up arms, were in no haſte to lay them down. They took poſſeſſion of all the avenues to the city; and their committee being ſummoned next morning by the natives to fulfil their engagements with reſpect to the burgherſhip, they held ſeveral meetings with the principal negatives on that ſubject, but without any ſucceſs: for though the latter readily agreed to an augmentation of the commercial privileges of the natives, they abſolutely refuſed to facilitate the acquiſition of the burgherſhip. The committee, however, embarraſſed and alarmed at the number and threats of the natives, determined to abide by what they had promiſed; drew up an edict permitting the natives to carry on trade, and to hold the rank of officers in the military aſſociations; and conferred the burgherſhip on more than 100 perſons taken from the natives and inhabitants, and even from the peaſants of the territory. This was approved by the three councils; the negatives, dreading the power of their adverſaries, who had made themſelves maſters of the city, not daring to make their appearance.

Thus the popular party imagined that they had got a complete victory; but they ſoon found themſelves deceived. They were prevailed upon by the deputies from Zurich and Berne (who had been ſent to conciliate the differences) to lay down their arms; and this was no ſooner done, than theſe ſame deputies declared the edict in favour of the natives to be null and illegal. The ſenate declared themſelves of the ſame opinion; and maintained, that the aſſent of the councils had been obtained only through fear of the repreſentants who were under arms, and whom none at that time durſt oppoſe. The repreſentants, exaſperated by this proceeding, preſented another remonſtrance on the 18th of March 1782, ſummoning the magiſtrates once more to confirm the edict; but a month afterwards received the laconic anſwer, that "government was neither willing nor able to confirm it." The natives, now finding themſelves diſappointed in their favourite object at the very time they had ſuch ſtrong hopes of obtaining it, behaved at firſt like frantic people; and theſe tranſports having ſubſided, an univerſal tumult took place. The moſt moderate of the popular party endeavoured in vain to allay their fury, by diſperſing themſelves in different quarters of the city; and the citizens, finding themſelves at laſt obliged either to abandon the party of the natives or to join them openly, haſtily adopted the latter meaſure; after which, as none could now oppoſe them, the officers of the repreſentants took poſſeſſion of the town, and quelled the inſurrection. Various negociations were carried on with the negatives in order to prevail upon them to ratify the edict, but without ſucceſs; on which a few of the magiſtrates were confined by the popular party along with the principal negatives; and as they juſtly expected the interference of France on account of what they had done, they reſolved to prolong the confinement of the priſoners, that they might anſwer the purpoſe of hoſtages for their own ſafety. In the mean time the body of citizens, deceived by the pretences of the popular party, acted as if their power was already eſtabliſhed and permanent. In conſequence of this, they depoſed ſeveral members of the great and little councils, appointing in their room an equal number of perſons who were favourable to the cauſe of the repreſentants. The great council thus new modelled, executed the edict for conferring the burgherſhip upon a number of the natives; and appointed a committee of ſafety, compoſed of eleven members, with very conſiderable authority. By this committee the public tranquillity was re-eſtabliſhed; after which, the fortifications were ordered to be repaired; and the people were buoyed up by the moſt dangerous notions of their own proweſs, and a confidence that France either durſt not attack them or did not incline to do ſo. In conſequence of this fatal error, they refuſed every offer of reconciliation which was made them from the other party; until at laſt troops were diſpatched againſt them by the king of Sardinia and the canton of Berne; and their reſpective generals, Meſſrs de la Marmora and Lentulus, being ordered to act in concert with the French commander M. de Jaucourt, who had advanced to the frontiers with a conſiderable detachment. The Genevans, however, vainly puffed up by a confidence in their own abilities, continued to repair their fortifications with indefatigable labour; the peaſants repaired from all quarters to the city, offering to mount guard and work at the fortifications without any pay; women of all ranks crowded to the walls as to a place of amuſement, encouraging the men, and even aſſiſting them in their labour. The beſiegers, however, advanced in ſuch force, that every perſon of diſcernment foreſaw that all reſiſtance would be vain. The French general Jaucourt, on the 29th of June 1782, diſpatched a meſſage to the Syndics; in which he inſiſted on the following humiliating conditions: 1. That no perſon ſhould appear on the ſtreets under pain of military puniſhment. 2. That a certain number of citizens, among whom were all the chiefs of the repreſentants, ſhould quit the place in 24 hours. 3. That all arms ſhould be delivered to the three generals. 4. That the depoſed magiſtrates ſhould be inſtantly re-eſtabliſhed: And, laſtly, That an anſwer ſhould be returned in two hours. By this meſſage the people were thrown into the utmoſt deſpair; and all without exception reſolved to periſh rather than to accept of terms ſo very diſgraceful. They inſtantly hurried to the ramparts with a view of putting their reſolution in force; but in the mean time the Syndics found means to obtain from the generals a delay of 24 hours. During this interval, not only men of all ages prepared for the approaching danger, but even women and children tore the pavement from the ſtreets, carrying the ſtones up to the tops of the houſes, with a view of rolling them down upon the enemy in caſe they ſhould force their way into the town. About 80 women and girls, dreſſed in uniforms, offered to form themſelves into a company for the defence of their country. The committee of ſafety accepted their ſervices, and placed them in a barrack ſecured from the cannon of the beſiegers. The negatives were greatly alarmed at this appearance of deſperate reſiſtance; and ſome of the moſt moderate among them endeavoured, but without ſucceſs, to effect a reconciliation. At the hour in which it was expected that the attack would begin, the ramparts were filled with defenders; and though the moſt zealous of the popular party had calculated only on 3000, upwards of 5000 appeared in the public cauſe. The French general, however, juſtly alarmed for the priſoners, who were now in imminent danger, again prolonged the period propoſed for the capitulation. By theſe repeated delays the ardour of the defendants began to abate. The women firſt began to figure to themſelves the horrors of a town taken by aſſault, and given up to an enraged and licentious ſoldiery; many timid perſons found means not only to diſguiſe their own fears, but to inſpire others with them under the pretence of prudence and caution: at laſt the committee of ſafety themſelves, who had ſo ſtrenuouſly declared for hoſtilities, entirely changed their mind. Being well apprized, however, that it would be dangerous for them to propoſe ſurrendering in the preſent temper of the people, they aſſembled the citizens in their reſpective circles, repreſenting, that if the city ſhould be attacked in the night, it would be no longer poſſible to convene them: for which reaſon they recommended to them that each circle ſhould nominate ſeveral deputies with full authority to decide in their ſtead; adding that they ought rather to appoint thoſe perſons who from their age and reſpectable character were capable of aſſiſting their country by their advice, while others were defending it by their valour. Thus a new council, compoſed of about 100 citizens, was formed; in which the chiefs by various manœuvres, firſt intimidating, and then endeavouring to perſuade the members of the neceſſity of ſurrendering, at laſt found means to take the thoughts of the people entirely off the defence of the city, and engage them in a ſcheme of general emigration. A declaration was drawn up to be delivered to the Syndics with the keys of the city, the chiefs ſummoned the principal officers from their poſts, ordered the cannon of ſeveral batteries to be rendered unfit for ſervice, and at laſt took care of themſelves by quitting the town. The people were in the utmoſt deſpair; and left the town in ſuch multitudes, that when the Sardinians entered it in the morning, they found it almoſt deſerted. This was followed by the reſtoration of the former magiſtrates, a complete ſubjection of the popular party, and the eſtabliſhment of a military government.

6
New conſtitution eſtabliſhed.

The changes which took place on this occaſion were as follow: 1. An abolition of the right of re-election. 2. The abolition of that right by which the general council nominated half the vacancies in the great council. 3. The right of remonſtrating was taken from the citizens at large, and veſted in 36 adjuncts, who might be preſent in the great council the firſt Monday of every month. They enjoyed a right of repreſentation, and in conſequence of that had a deliberate voice; but on the whole were ſo inſignificant, that they were nicknamed *Les Images*, or "The Shadows." 4. The introduction of the grabeau, or annual confirmation of the members of the ſenate and of the great council, veſted entirely in the latter. By this law part of the authority both of the ſenate and general council was transferred to the great council; and by ſubjecting the ſenate to this annual reviſion, its power was greatly leſſened, and it was made in fact dependent upon the general council. 5. The circles or clubs in which it was cuſtomary to convene the citizens, and all public aſſemblies whatever, were prohibited; and ſo rigorouſly was this carried into execution, that the ſociety of arts was prohibited from meeting. 6. The militia was aboliſhed; firing at marks, even with bows and arrows, was prohibited; and the town, inſtead of being guarded by the citizens, was now put under the care of 1000 foreign ſoldiers, whoſe colonel and major were both to be foreigners. Theſe troops were to take an oath of fidelity to the republic, and of obedience to the great council and the committee of war; but were under the immediate command and inſpection of the latter, and ſubject to the ſuperior controul of the former. 7. No perſon was permitted to bear arms, whether citizen, native, or inhabitant. 8. Several taxes were impoſed without the conſent of the general council; but in time to come it was provided, that every change or augmentation of the revenue ſhould be ſubmitted to that body. 9. Several privileges with regard to trade and commerce, formerly poſſeſſed the citizens alone, were now granted both to citizens and inhabitants.

Scheme of ſettling a number of Genevans in Ireland.

It is not to be ſuppoſed that this revolution would be agreeable to people who had ſuch a ſtrong ſenſe of liberty, and had been accuſtomed to put ſuch a value upon it, as the Genevans. From what has been already related, it might ſeem reaſonable to conclude, that an almoſt univerſal emigration would have taken place: but after their reſentment had time to ſubſide, moſt of thoſe who fled at firſt, thought proper to return; and, in the opinion of Mr Coxe, not more than 600 finally left their country on account of the revolution in 1782. The emigrants principally ſettled at Bruſſels and Conſtance, where they introduced the arts of printing linens and watchmaking. Soon after the revolution, indeed, a memorial, ſigned by above 1000 perſons of both ſexes, all of them either poſſeſſed of ſome property or verſed in trade or manufactures, was preſented to the earl of Temple, then lord lieutenant of Ireland, expreſſing a deſire to ſettle in that kingdom. The propoſal met with general approbation; the Iriſh parliament voted L. 50,000 towards defraying the expences of their journey, and affording them a proper ſettlement in the iſland. Lands were purchaſed for L.8000 in a convenient ſituation near Waterford; part of New Geneva was actually completed at the expence of L. 10,000; a charter was granted with very conſiderable privileges; the ſtandard of gold was altered for the accommodation of the watch manufacturers; and the foundation of an academy laid upon an uſeful and liberal plan. Several Genevans landed in Ireland in the month of July 1783; but when the nation had expended near L. 30,000 on the ſcheme, it was ſuddenly abandoned. This ſeems principally to have been owing to the delays neceſſarily occaſioned in the execution of ſuch a complicated plan; and in ſome degree alſo by the high demands of the Genevan commiſſioners, who required many privileges inconſiſtent with the laws of Ireland. By theſe delays the Genevans, whoſe character ſeems not to be *preſeverance*, were induced to abandon the ſcheme, and return to their former place of reſidence. Even the few who had already landed, though maintained at the public expence, were diſcontented at not finding the new town prepared for their

their reception ; and as theſe among the propoſed emigrants who poſſeſſed the greateſt ſhare of property had already withdrawn their names, the remainder did not chooſe to remain in a country where they had not captial ſufficient to carry on any conſiderable trade or manufacture. A petition was then preſented by the Genevan commiſſioners, requeſting that L.10,000 of the L.50,000 voted might be appropriated to the forming a capital : but as this had been voted for other purpoſes, the petition was of courſe rejected ; in conſequence of which, the Genevans relinquiſhed the ſettlement by an addreſs, and ſoon after quitted the iſland.

8
New revolution in 1789.

The people of Old Geneva, though returned to their former place of abode, were far from being inclined to ſubmit to the yoke with patience. They were obliged to pay heavy taxes for maintaining a military force expreſsly calculated to keep themſelves in ſubjection; and ſo intolerable did this appear, that in a few years every thing ſeemed ready for another revolution. The ſucceſs of this ſeemed more probable than that of the former, as France was not now in a condition to interfere as formerly. The general ferment ſoon roſe to ſuch a height, that government was obliged to call in the aid of the military to quell a tumult which happened in the theatre. This produced only a temporary tranquillity; another tumult took place on the 26th of January 1789, on account of the publication of an edict raiſing the price of bread a farthing per pound. On this the people inſtantly roſe; plundered the bakers ſhops ; and next day a carriage loaded with bread and eſcorted by ſoldiers was plundered in its way to the diſtribution office. The ſoldiers fired on the populace, by which one man was killed and another wounded : but the tumult ſtill increaſing, the ſoldiers were driven away ; and the body of the deceaſed was carried in a kind of proceſſion before the town-houſe, as a monument of the violence and oppreſſion of the ariſtocratic party. The magiſtrates in the mean time ſpent their time in deliberation, inſtead of taking any effectual method of quelling the inſurrection. The people made the beſt uſe of the time afforded them by this delay of the magiſtrates : they attacked and carried two of the gates, dangerouſly wounding the commanding officer as he attempted to allay the fury of both parties. At laſt the magiſtrates diſpatched againſt them a conſiderable body of troops, whom they thought the inſurgents would not have the courage to reſiſt ; but in this they found themſelves deceived. The people had formed a ſtrong barricade, behind which they played off two fire-pumps filled with boiling water and ſoap lyes againſt the extremities of two bridges which the military had to croſs before they could attack them. The commanding officer was killed and ſeveral of his men wounded by the diſcharge of ſmall arms from windows ; and the pavement was carried up to the tops of houſes in order to be thrown down upon the troops if they ſhould force the barricades and penetrate into the ſtreets. The tumult in the mean time continued to increaſe, and was in danger of becoming univerſal; when the magiſtrates, finding it would be impoſſible to quell the inſurgents without a great effuſion of blood, were reduced to the neceſſity of complying with their demands. One of the principal magiſtrates repaired in perſon to the quarter of St Gervais, proclaimed an edict for lowering the price of bread, granted a general amneſty, and releaſed all the inſurgents who had been taken into cuſtody. Thus a momentary calm was produced ; but the leaders of the inſurrection, ſenſible that the magiſtrates were either unable or unwilling to employ a ſufficient force againſt them, reſolved to take advantage of the preſent opportunity to procure a new change of government. A new inſurrection, therefore, took place on the 29th of the month, in which the ſoldiers were driven from their poſts, diſarmed, and the gates ſeized by the people. The magiſtrates then, convinced that all oppoſition was fruitleſs, determined to comply with the demands of their antagoniſts in their full extent ; and the ariſtocratical party ſuddenly changing their ſentiments, renounced in a moment that ſyſtem to which they had hitherto ſo obſtinately adhered. On the application of the ſolicitor general, therefore, for the recovery of the ancient liberties of the people, the permiſſion of bearing arms, re-eſtabliſhment of the militia, and of their circles or political clubs, the removal of the garriſon from the barracks, and the recall of the repreſentants who were baniſhed in 1782 ; theſe moderate demands were received with complacency, and even ſatisfaction. The preliminaries were ſettled without difficulty, and a new edict of pacification was publiſhed under the title of *Modifications a l'Edition de* 1782, and approved by the ſenate, great council, and general council. So great was the unanimity on this occaſion, that the modifications were received by a majority of 1321 againſt 52. The pacification was inſtantly followed by marks of friendſhip betwixt the two parties which had never been experienced before; the ſons of the principal negatives frequented the circles of the burghers ; the magiſtrates obtained the confidence of the people ; and no monument of the military force ſo odious to the people will be allowed to remain. “The barracks of the town-houſe (ſays Mr Coxe) are already evacuated, and will be converted into a public library; the new barracks, built at an enormous expence, and more calculated for the garriſon of a powerful and deſpotic kingdom than for a ſmall and free commonwealth, will be converted into a building for the univerſity. The reformation of the ſtudies, which have ſcarcely received any alteration ſince the time of Calvin, is now in agitation. In a word, all things ſeem at preſent to conſpire for the general good; and it is to be hoped that both parties, ſhocked at the recollection of paſt troubles, will continue on as friendly terms as the jealous nature of a free conſtitution will admit.

GENEVA Lake. This lake is in the ſhape of a creſcent; along the concave ſide of which Mr Coxe travelled 54 miles. Switzerland forms the hollow, and Savoy the convex part ; the greateſt breadth being about 12 miles. The country on the ſide of Savoy is full of high and craggy mountains ; but from Geneva to the environs of Lauſanne it ſlopes to the margin of the lake, and is very rich and fertile. The banks riſe conſiderably in the neighbourhood of Lauſanne, and form a moſt beautiful terrace, with a rapid deſcent a few miles beyond the town. A plain begins in the neighbourhood of Vevay, which continues for a great way beyond the end of the lake, but contracting towards the water by the approach of the mountains.

The like itſelf appears at a diſtance of a beautiful blue colour, and the water is very clear and tranſparent. Near Geneva the coaſt of the lake abounds with pebbles; between that city and Lauſanne it is ſandy; from thence to Chillon it is bounded by hard calcareous rocks; and the extremity of the ſhore is a marſh formed by mud collected from the river Rhone. The greateſt depth of this lake found by M. de Luc is 160 fathoms. Here the birds called *tippet grebes* make their appearance in December, and retire in February to other places where they breed. They make floating neſts of reeds; but as the lake of Geneva affords none of theſe, they are obliged to migrate to other places where they grow. Their ſkins are much eſteemed, and ſell for 12 or 14s. each. The lake of Geneva, like all others ſituated between mountains, is ſubject to ſudden ſtorms.

GENEVA, or *Gin*, among diſtillers, an ordinary malt ſpirit, diſtilled a ſecond time, with the addition of ſome juniper berries.

Originally, the berries were added to the malt in the grinding; ſo that the ſpirit thus obtained was flavoured with the berries from the firſt, and exceeded all that could be made by any other method. At preſent, they leave out the berries entirely, and give their ſpirits a flavour by diſtilling them with a proper quantity of oil of turpentine; which, though it nearly reſembles the flavour of juniper-berries, has none of their valuable virtues.

GENEVIEVE, fathers or religious of; the name of a congregation of regular canons of the order of St Auguſtine, eſtabliſhed in France.

The congregation of St Genevieve is a reform of the Auguſtine canons. It was begun by St Charles Faure, in the abbey of St Vincent de Senlis, of which he was a member in the year 1618.

In the year 1634, the abbey was made elective; and a general chapter, compoſed of the ſuperiors of 15 houſes who had now received the reform, choſe F. Faure coadjutor of the abbey of St Genevieve, and general of the whole congregation. Such were its beginnings.

It has ſince increaſed very much, and it now conſiſts of above a hundred monaſteries; in ſome whereof the religious are employed in the adminiſtration of the pariſhes and hoſpitals; and in others in the celebration of divine ſervice, and the inſtruction of eccleſiaſtics in ſeminaries for the purpoſe.

The congregation takes its name from the abbey of St Genevieve, which is the chief of the order, and whoſe abbot is the general thereof. The abbey itſelf took its name from St Genevieve, the patroneſs of the city of Paris, who died in the year 512. Five years after her death, Clovis erected the Church of St Genevieve, under the name and invocation of St Peter, where her relics are ſtill, or were till lately, preſerved, her ſhrine viſited, and her image carried with great proceſſions and ceremonies upon extraordinary occaſions, as when ſome great favour is to be intreated of heaven.

GENGISKHAN, the renowned ſovereign of the Moguls, a barbarous and bloody conqueror. See JENGHIZ KHAN, and (*Hiſtory* of the) MOGULS.

GENIAL, an epithet given by the Pagans to certain gods who were ſuppoſed to preſide over generation.

The genial gods, ſays Feſtus, were earth, air, fire, and water. The twelve ſigns, together with the ſun and moon, were ſometimes alſo ranked in the number.

GENII, a ſort of intermediate beings, by the Mahometans believed to exiſt, between men and angels. They are of a groſſer fabric than the latter, but much more active and powerful than the former. Some of them are good, others bad, and they are capable of future ſalvation or damnation like men. The Orientals pretend that theſe genii inhabited the world many thouſand years before the creation of Adam, under the reigns of ſeveral princes, who all bore the common name of Solomon: that falling at length into an almoſt general corruption, Eblis was ſent to drive them into a remote part of the earth, there to be confined: and that ſome of the generation ſtill remaining were by Tahmurath, one of the ancient kings of Perſia, forced to retreat into the famous mountain of *Kaf*; of whoſe ſucceſſions and wars they have many fabulous and romantic ſtories. They alſo made ſeveral ranks and degrees among this kind of beings (if they are not rather different ſpecies); ſome being abſolutely called *Jin*; ſome *Peri*, or fairies; ſome *Div*, or giants; and other *Tacwins*, or fates.

GENIOGLOSSI, in anatomy. See ANATOMY, *Table of the Muſcles*.

GENIOHYOIDÆUS, in anatomy. *Ibid.*

GENOSTOMA, in botany: A genus of the monogynia order, belonging to the pentandria claſs of plants. The calyx is a turbinated quinquefid perianthium; the corolla monopetalous and tubular; the ſtamina five ſhort filaments; the antheræ oblong; the ſeeds very numerous and ſubangulated, placed on a filiform receptacle.

GENIPPA, in botany: A genus of the monogynia order, belonging to the pentandria claſs of plants; and in the natural method ranking under the 30th order, *Contortæ*. The corolla is wheel-ſhaped; the ſtigma club-ſhaped; the berry bilocular; the ſeeds neſtling in a carnous heart-ſhaped ſubſtance.

GENISTA, BROOM, or DYERS-WEED: A genus of the decandria order, belonging to the diadelphia claſs of plants; and in the natural method ranking under the 32d order *Papilionaceæ*. The calyx is bilabiate, the upper lip bidented, the under one tridentate; the vexillum is oblong and reflected, or turned back from the piſtil and ſtamina. There are ſeveral ſpecies; of which the moſt remarkable are, the cytiſo-geniſta, or common broom; and the tinctoria, or dyers weed—The firſt is too well known to need deſcription. Its young flowers are ſometimes preſerved as pickles; and the plant, when burnt, affords a tolerably pure alkaline ſalt. Dr Mead relates the caſe of a dropſical patient that was cured by taking half a pint of a decoction of green broom tops, with a ſpoonful of whole white muſtard ſeed, every morning and evening. The patient had been tapped three times, and tried the uſual remedies before. An infuſion of the ſeeds, drank freely, has been known to produce ſimilar happy effects; but theſe are by no means to be expected in every inſtance. Cows, horſes, and ſheep, refuſe the plant.—2. The tinctoria is alſo a native of Britain.

It riſes with ſhrubby ſtalks three feet high, garniſhed with ſpear-ſhaped leaves placed alternate, and terminated by ſeveral ſpikes of yellow flowers, ſucceeded by pods. The branches of the plant are uſed by dyers for giving a yellow colour; from whence it is called *dyers-broom, green-wood, wood-waxen* or *dyers-weed.* A dram and an half of the powdered ſeeds operate as a mild purgative. A collection of the plant is diuretic; and, like the former, has proved ſerviceable in dropſical caſes. Horſes, cows, goats, and ſheep eat it.

GENITAL, an appellation given to whatever belongs to the parts of generation. See ANATOMY, n° 107, 108.

GENITES, among the Hebrews, thoſe deſcended from Abraham, without any mixture of foreign blood.

The Greeks diſtinguiſhed by the name of *genites* ſuch of the Jews as were iſſued from parents, who, during the Babyloniſh captivity, had not allied with any gentile family.

GENITIVE, in grammar, the ſecond caſe of the declenſion of nouns. The relation of one thing conſidered as belonging in ſome manner to another, has occaſioned a peculiar termination of nouns called the *genitive caſe*; but in the vulgar tongues they make uſe of a ſign to expreſs the relation of this caſe. In Engliſh they prefix the article *of*, in French *de* or *du*, &c. Though in ſtrictneſs there are no caſes in either of theſe languages; inaſmuch as they do not expreſs the different relations of things by different terminations, but by additional prepoſitions, which is otherwiſe in the Latin.

GENIUS, a good or evil ſpirit or dæmon, whom the ancients ſuppoſed ſet over each perſon, to direct his birth, accompany him in life, and to be his guard. See DÆMON.

Among the Romans, Feſtus obſerves, the name *genius* was given to the god who had the power of doing all things, *deum qui vim obtineret rerum omnium gerendarum*; which Voſſius, *de Idol.* rather chooſes to read *genendarum*, who has the power of producing all things; by reaſon Cenſorius frequently uſes *genere* for *gignere*.

Accordingly, St. Auguſtin *de Civitat. Dei*, relates, from Varro, that the genius was a god who had the power of generating all things; and preſided over them produced.

Feſtus adds, that Auſuſtius ſpake of the genius as the Son of God, and the Father of men, who gave them life; others, however, repreſented the genius as the peculiar or tutelary god of each place: and it is certain, the laſt is the moſt uſual meaning of the word. The ancients had their *genii* of nations, of cities, of provinces, &c. Nothing is more common than the following inſcription on medals, GENIUS POPULI ROM. "the genius of the Roman people;" or GENIO POP. ROM. "to the genius of the Roman people." In this ſenſe, *genius* and *lar* were the ſame thing; as, in effect, Cenſorius and Apulius affirm they were. See LARES and PENATES.

The Platoniſts, and other eaſtern philoſophers, ſuppoſed the *genii* to inhabit the vaſt region or extent of air between earth and heaven. They were a ſort of intermediate powers, who did the office of mediators between gods and men. They were the interpreters and agents of the gods; communicated the wills of the deities to men; and the prayers and vows of men to the gods. As it was unbecoming the majeſty of the gods to enter into ſuch trifling concerns; this became the lot of the *genii*, whoſe nature was a mean between the two; who derived immortality from the one, and paſſions from the other; and who had a body framed of an aërial matter. Moſt of the philoſophers, however, held, that the genii of particular men were born with them, and died; and Plutarch attributes the ceaſing of oracles partly to the death of the genii. See ORACLE.

The heathens, who conſidered the genii as the guardians of particular perſons, believed that they rejoiced and were afflicted at all the good and ill fortune that befel their wards. They never, or very rarely, appeared to them; and then only in favour of ſome perſon of extraordinary virtue or dignity. They likewiſe held a great difference between the genii of different men; and that ſome were much more powerful than others: on which principle it was, that a wizard in *Appian* bids Anthony keep at a diſtance from Octavius, by reaſon Anthony's genius was inferior to and ſtood in awe of that of Octavius. There were alſo evil genii, who took a pleaſure in perſecuting men, and bringing them evil tidings: ſuch was that in *Paterculus*, &c. which appeared to Brutus the night before the battle of Philippi. Theſe were alſo called *larvæ*, and *lemures*. See LARVÆ and LEMURES.

GENIUS, in matters of literature, &c. a natural talent or diſpoſition to do one thing more than another; or the aptitude a man has received from nature to perform well and eaſily that which others can do but indifferently and with a great deal of pains.

To know the bent of nature is the moſt important concern. Men come into the world with a genius determined not only to a certain art, but to certain parts of that art, in which alone they are capable of ſucceſs. If they quit their ſphere, they fall even below mediocrity in their profeſſion. Art and induſtry add much to natural endowments, but cannot ſupply them where they are wanting. Every thing depends on genius. A painter often pleaſes without obſerving rules; whilſt another diſpleaſes though he obſerves them, becauſe he has not the happineſs of being born with a genius for painting.

A man born with a genius for commanding an army, and capable of becoming a great general by the help of experience, is one whoſe organical conformation is ſuch, that his valour is no obſtruction to his preſence of mind, and his preſence of mind makes no abatement of his valour. Such a diſpoſition of mind cannot be acquired by art: it can be poſſeſſed only by a perſon who has brought it with him into the world. What has been ſaid of theſe two arts may be equally applied to all other profeſſions. The adminiſtration of great concerns, the art of putting people to thoſe employments for which they are naturally formed, the ſtudy of phyſic, and even gaming itſelf, all require a genius. Nature has thought fit to make a diſtribution of her talents among men, in order to render them neceſſary to one another; the wants of men being the very firſt link of ſociety: ſhe has therefore pitched upon particular perſons, to give them aptitude to perform rightly ſome things which ſhe has rendered impoſſible to others; and the latter have a greater facility granted them for other things, which facility has been refuſed to the former. Nature, indeed, has made an unequal diſtribution of her bleſſings among her children; yet ſhe has diſinherited none; and a man diveſted of all kinds of abilities, is as great a phenomenon as an univerſal genius.

From the diverſity of genius, the difference of inclination ariſes in men, whom nature has had the precaution of leading to the employments for which ſhe deſigns them, with more or leſs impetuoſity in proportion to the greater or leſſer number of obſtacles they have to ſurmount in order to render themſelves capable of anſwering this vocation. Thus the inclinations of men are ſo very different, becauſe they follow the ſame mover, that is, the impulſe of their genius. This, as with the painter, is what renders one poet pleaſing, even when he treſpaſſes againſt rules; while others are diſagreeable, notwithſtanding their ſtrict regularity.

The genius of theſe arts, according to the abbe du Bos conſiſts in a happy arrangement of the organs of the brain; in a juſt conformation of each of theſe organs; as alſo in the quality of the blood, which diſpoſes it to ferment, during exerciſe, ſo as to furniſh plenty of ſpirits to the ſprings employed in the functions of the imagination. Here he ſuppoſes that the compoſer's blood is heated; for that painters and poets cannot invent in cool blood; nay, that it is evident they muſt be wrapt into a kind of enthuſiaſm when they produce their ideas. Ariſtotle mentions a poet who never wrote ſo well as when his poetic fury hurried him into a kind of phrenzy. The admirable pictures we have in Taſſo of Armida and Clorinda, were drawn at the expence of a diſpoſition he had to real madneſs into which he fell before he died. "Do you imagine (ſays Cicero), that Pacuvius wrote in cold blood? No, it was impoſſible. He muſt have been inſpired with a kind of fury, to be able to write ſuch admirable verſes."

GENOA, a city of Italy, and capital of a republic of the ſame name, ſituated in E. Long. 9. 30. N. Lat. 44. 30.—By the Latin authors it is very frequently, though corruptly, called *Janua;* and its preſent territories made part of the ancient Liguria. The era of its foundation is not known. In the time of the ſecond Punic war it was a celebrated emporium; and having declared for the Romans, was plundered and burnt by Mago the Carthaginian. It was afterwards rebuilt by the Romans; and with the reſt of Italy continued under their dominions till the decline of the weſtern empire in 476. Soon after, it fell under the power of Theodoric the Oſtrogoth; who having defeated the uſurper Odoacer, became king of Italy. This happened in the year 498; and in a ſhort time, the Goths being almoſt entirely ſubdued by Beliſarius the emperor Juſtinian's general, Genoa was reannexed to the Roman empire. In 1638, it was plundered and burnt by the Lombards, whoſe king Protharis erected it into a provincial dukedom.

The Lombards continued maſters of Genoa till the year 774, when they were conquered by Charles the Great, ſon to Pepin king of France. He reduced Liguria to the ancient bounds ſettled by Auguſtus, and erected it into a marquiſate; appointing his relation *Audemarus* the firſt count or margrave. Genoa at this time being diſtinguiſhed for its wealth and populouſneſs, began to give its name to the whole coaſt; and continued under the dominion of theſe counts for about 100 years, till the race of the Pepins became entirely extinct in Italy, and the empire was transferred to the German princes.—In the year 935 or 936, while the Genoeſe forces were abſent on ſome expedition, the Saracens ſurpriſed the city, which they plundered and burnt, putting to death a great number of the inhabitants, and carrying others into captivity. Having embarked their captives, together with an immenſe booty, they ſet ſail for Africa: but the Genoeſe immediately returning, purſued the invaders; and having entirely defeated them, recovered all the captives and booty, and took a great many of the enemy's ſhips.

About the year 950, the Franks having loſt all authority in Italy, the Genoeſe began to form themſelves into a republic, and to be governed by their own magiſtrates, who were freely elected, and took the name of *Conſuls*. In order to ſupport their independence, they applied themſelves with great aſſiduity to commerce and navigation; and being apprehenſive that ſome of the German emperors, who frequently entered Italy as invaders, might renew their pretenſions to their ſtate, they conſented to acknowledge Berengarius III. duke of Friuli, who had been elected emperor by a party of Italian nobles. Berengarius, who had much ado to maintain himſelf in his new dignity, endeavoured by his conceſſions to enlarge the number of his friends and adherents; and accordingly made no difficulty to confirm the new republic in all its rights and privileges. After this the Genoeſe began to extend their commerce from Spain to Syria, and from Egypt to Conſtantinople; their veſſels, according to the cuſtom of theſe times, being fitted for fighting as well as merchandiſe. Having thus acquired great reputation, they were invited in 1017, by the Piſans, who had likewiſe formed themſelves into republic, to join with them in an expedition againſt Sardinia, which had been conquered by the Moors. In this expedition they were ſucceſsful; the iſland was reduced; but from this time an enmity commenced between the two republics, which did not end but with the ruin of the Piſans.

The firſt war with Piſa commenced about 30 years after the Sardinian expedition, and laſted 18 years; when the two contending parties having concluded a treaty of peace, jointly ſent their forces againſt the Moors in Africa, of whom they are ſaid to have killed 100,000. The Genoeſe were very active in the time of the cruſades, and had a principal ſhare in the taking of Jeruſalem. They alſo waged conſiderable war with the Moors in Spain, of whom they generally got the better. They alſo prevailed againſt the neighbouring ſtates; and, in 1220, had enlarged their territories beyond the ſkirts of the Appenines, ſo that the reſt of Italy looked upon them with a jealous eye: but in 1311 the factions which had for a long time reigned in the city, notwithſtanding all its wealth and power, induced the inhabitants to ſubmit themſelves for 20 years to the dominion of Henry VII. emperor of Germany. That emperor, however, died in Auguſt 1312; and the vicar he had left, ſoon after went to Piſa, upon on which the diſſenſions in Genoa revived with greater fury than ever. In 1317, a quarrel happened between the families of Spinola and Doria; which came to ſuch an height, that both parties fought in the ſtreets for 24 days without intermiſſion, raiſed battering engines againſt each others houſes, and filled the city with blood. At laſt the Spinolæ quitted the city, and retired to their territories in the Appenine mountains. The civil war continued till the year 1331; when, by the meditation of the king of Naples, it was concluded, that all exiles ſhould return to the city; that the republic ſhould be governed by the king's vicar; and all the offices of the ſtate be equally divided between the Guelfs and the Gibellines, the two contending parties.

By this ruinous war, the coaſt of Genoa, formerly adorned with palaces and vineyards, was now reduced to the appearance of a barren waſte. So great was the general deſolation, that, according to Petrarch, the ſpectators who ſailed along were ſtruck with aſtoniſhment and horror. Villani, a cotemporary author, relates, that it was ſuppoſed by the learned, that greater exploits had not been performed at the ſiege of Troy; and that the loſſes each party had ſuſtained would have been ſufficient to have purchaſed a kingdom, the Genoeſe republic being in his time the richeſt and moſt powerful ſtate in Chriſtendom. The annaliſt Stella informs us, that, before the war, the moſt extravagant profuſion and luxury prevailed among the Genoeſe: but that, towards the end, many noble families were reduced to indigence and poverty; ſo that, about 100 years after, it became faſhionable for the nobles to live in a plain manner, without any ſhow or magnificence.

In 1336, both parties, ſuſpending their mutual animoſities, ſent two fleets of 20 galleys each into the German ocean, to the aſſiſtance of the king of France, who was engaged in a war with Edward III. king of England. This naval expedition proved the cauſe of a moſt remarkable revolution in the Genoeſe government. The ſailors of the fleet, thinking themſelves injured by their officers, whom they accuſed of defrauding them of their pay, proceeded to an open mutiny; and, having expelled the admiral, and other commanders, ſeized the galleys. The king of France being choſen arbitrator, decided in favour of the officers, and impriſoned 16 of the chiefs of the mutineers. Upon this ſeveral of the ſailors left the fleet, and returned to Genoa; where they went round the coaſts, repeating their mutinous complaints, which were greatly hearkened to, upon a falſe report that the mutineers who had been impriſoned were broke upon the wheel. The factious ſpirit increaſed; and at laſt the Genoeſe inſiſted in a tumultuous manner for having an abbot of their own chooſing, and 20 of the people with the conſent of the captains of the republic aſſembled for that purpoſe. While the mob were impatiently expecting their deciſion, a mechanic, generally accounted a fool, mounted a wooden bench, and called out that one Simon Bucanigree ſhould be choſen abbot. This being inſtantly echoed by the populace, he was firſt declared *abbot*, then *lord*, and at laſt *duke* of Genoa.

This new expedient did not at all anſwer the purpoſe. The diſſenſions continued as violent as ever, notwithſtanding the power of the new magiſtrates; and by theſe perpetual diviſions the republic was at laſt ſo much weakened, that in 1390 the king of France was declared Lord of Genoa. Under the French government, however, they ſoon became exceedingly impatient; and, in 1422, the duke of Milan obtained the ſovereignty. With this ſituation they were equally diſpleaſed, and therefore revolted in 1436. Twenty-two years after, finding themſelves preſſed by a powerful fleet and army ſent by Alphonſo king of Naples, they again conferred the ſoverignty of their ſtate upon the king of France. In 1460, they revolted from the French; and, four years after, put themſelves again under the protection of the duke of Milan; from whom they revolted in 1478. He was again declared ſovereign of the republic in 1488; and, 11 years after, the city and territories of Genoa were conquered by Louis XII. of France.

The almoſt unparalleled fickleneſs of the Genoeſe diſpoſition was not to be corrected by this misfortune. They revolted in 1506; but next year were again ſubdued by Louis. Six years after, they again revolted; and in 1516, the city was taken and plundered by the Spaniards. In 1528, Andrew Doria, a Genoeſe admiral in the ſervice of the French, undertook to reſcue his country from the dominion of foreign princes, and reſtore it to its liberty. Knowing well the fickle diſpoſition of his countrymen, he took all occaſions of exciting diſcontents among them againſt the government. He perſuaded them, that the French (who had again obtained the ſovereignty) had left them only a ſhadow of liberty, while they pretended to protect them from their enemies. To the nobility he repreſented the diſgrace of ſuffering the government to be veſted in the hands of foreigners leſs worthy of authority than themſelves. Thus he ſoon formed a ſtrong faction, and formed his plan; for the execution of which he took the moſt proper time, namely, when almoſt three-fourths of the French garriſon had been carried off by the plague. He advanced with 500 men; and his friends having opened the gates of the city to him, he ſeized the principal poſts, and thus became maſter of it without drawing his ſword. The garriſon retired to the forts, where they ſoon after capitulated, and being driven out of the city, Doria reeſtabliſhed the ancient form of government. See DORIA.

The republic hath ſince continued to preſerve her liberty, though greatly fallen from her ancient ſplendor, and now become a very inconſiderable ſtate. In 1684, the Genoeſe had the misfortune to fall under the reſentment of Louis XIV. at which time the city was almoſt deſtroyed by a formidable bombardment. In the year 1688, it was bombarded by admiral Byng, and forced to capitulate; but there were at that time no views of making a permanent conqueſt of the city. In 1730, the iſland of Corſica revolted from the Genoeſe, and could never afterwards be reduced by them; for which reaſon it was ſold to the French, who in the year 1770 totally reduced it.

The Genoeſe territories extend along that part of the Mediterranean ſea, commonly called the *gulph of Genoa*, about 152 miles; but their breadth is very unequal, being from eight to about 20 miles. When they are not bounded by the ſea, the following ſtates and countries, taking them from weſt to eaſt, are their boundaries, *viz.* Piedmont, Montferrat, Milan, Placentia, Parma, the dukedom of Tuſcany, and the republic of Lucca. This tract, though a great part of it is mountainous, and ſome of that barren enough, yet produces plenty of excellent fruit, good paſture, wood, garden-ſtuff, and mulberry-trees, with ſome wine and oil, but little corn. What they want of the laſt, they have either from Lombardy, Sicily, or Naples.

Genoa ſtands on the coaſt of the Mediterranean ſea, at the bottom of a little gulph, partly on the flat, and partly on the declivity of a pleaſant hill; in conſequence of which, it appears to great advantage from the ſea. It is defended on the land-ſide by a double wall, which in circumference is about ten Italian miles. Two of the ſtreets conſiſt entirely of a double ſtraight row of magnificent palaces. The others, though clean and well paved, are crooked and narrow. The palaces of the nobility are almoſt all of marble, and many of them are painted on the outſide. That there ſhould be ſuch a profuſion of marble here, is not to be wondered at, as the neighbouring hills abound with it. The city contains a vaſt number of palaces, churches, and convents, and ſeveral hoſpitals. The palace where the doge reſides, and where the great and little council, and the two colleges of the procuratori and governatori aſſemble, is a large ſtone building in the centre of the city: but it contains ſome fine paintings in freſco; two ſtatues of Andrew and John Doria in white marble; and an arſenal, in which are ſaid to be arms for thirty-four thouſand men, with a ſhield, containing one hundred and twenty piſtol-barrels, and thirty-three coats of mail, which, it is pretended, were worn by as many Genoeſe heroines in a croiſade. Of the churches, the fineſt are thoſe of the Annunciation, St Mary Carignan, St Dominic, and St Martha. In the cathedral is a diſh made of a ſingle emerald. All the inhabitants here, except the principal ladies, who are carried in chairs, walk on foot, on account of the narrowneſs or ſteepneſs of the ſtreets. The fortifications of the city, towards the ſea, are remarkably ſtrong. There are two fine ſtone-bridges over the rivers Bonzevera and Biſagno, the firſt whereof waſhes the weſt, and the other the eaſt ſide of the city, within which there is alſo a ſurpriſing ſtone-bridge joining two hills. The harbour, though large, is far from being ſafe; but no care or expence have been ſpared to render it as ſafe and commodious as poſſible. The wind to which it is moſt expoſed, is that called *Labeccio*, or the ſouth-weſt. The place where the republic's galleys lie, is called the Darſena, where are a great number of Turkiſh ſlaves. On a rock, on the weſt ſide of the harbour, is the fanal or light-houſe, a high tower, on the top of which is a lanthorn, containing thirty-ſix lamps. The trade of Genoa is chiefly in velvets, damaſks, pluſh, and other ſilks, brocades, lace, gloves, ſweetmeats, fruits, oil, Parmeſan cheeſe, anchovies, and medicinal drugs from the Levant; but the badneſs of the harbour, and the high price of commodities, greatly check its commerce. In 1751, Genoa was declared a free port for ten years, under certain reſtrictions: in that called *Porto Franco*, any merchant may have a ware-houſe, and import or export goods duty-free; but ſuch as are diſpoſed of in the city, or on the continent, are taxed pretty high. The nobility are allowed to trade in the wholeſale way; to carry on velvet, ſilk, and cloth manufactures; and to have ſhares in merchant-ſhips: and ſome of them, as the Palavacini, are actually the greateſt merchants in Genoa. Another very profitable article of trade carried on by them is banking, and dealing in bills of exchange. A new academy of painting, ſculpture, civil and military architecture, was inſtituted here in 1751. One may walk the ſtreets of Genoa in the night with the greateſt ſafety, which is more than can be ſaid of many cities in Italy. Exceſſive ſplendor and luxury are, in ſeveral reſpects, reſtrained by ſalutary laws. No beggars are permitted to aſk alms in Genoa, and the inns are better than thoſe at Turin. When a ſingle perſon is buried, a kind of garland of all ſorts of artificial flowers is placed on the coffin. The Genoeſe in general are eſteemed crafty, induſtrious, and inured to labour above the other Italians.

GENSING. See PANAX.

GENTIANA, GENTIAN, in botany: A genus of the digynia order, belonging to the pentandria claſs of plants; and in the natural method ranking under the 20th order, *Rotaceæ*. The corolla is monopetalous; the capſule bivalved and unilocular; there are two longitudinal receptacles. The moſt remarkable ſpecies are the following:

1. The lutea, or common gentian of the ſhops. It is a native of the mountainous parts of Germany; from whence the roots, the only part uſed in medicine, are brought to Britain. Theſe have a yellowiſh-brown colour, and a very bitter taſte. The lower leaves are of an oblong oval ſhape, a little pointed at the end, ſtiff, of a yellowiſh green, and have five large veins on the back of each. The ſtalk riſes four or five feet high, garniſhed with leaves growing by pairs at each joint, almoſt embracing the ſtalk at their baſe. They are of the ſame form with the lower, but diminiſh gradually in their ſize to the top. The flowers come out in whirls at the joints on the upper part of the ſtalks, ſtanding on ſhort foot-ſtalks, whoſe origin is in the wings of the leaves. They are of a pale yellow colour.—The roots of this plant are very frequently uſed in medicine as ſtomachic bitters. In taſte they are leſs exceptionable than moſt of the ſubſtances of this claſs. Infuſions of gentian-root flavoured with orange-peel, are ſufficiently grateful. Some years ago a poiſonous root was diſcovered among the gentian brought to London; the uſe of which occaſioned violent diſorders, and in ſome caſes death. This root is eaſily diſtinguiſhed from the gentian, by its being internally of a white colour, and void of bitterneſs.

2. The centaureum, or leſſer centaury of the ſhops, is a native of many parts of Britain. It grows on dry paſtures; and its height is commonly proportioned to the goodneſs of the ſoil, as in rich ſoils it will grow to the height of a foot, but in poor ones not above three or four inches. It is an annual plant, with upright branching ſtalks, garniſhed with ſmall leaves, placed by pairs. The flowers grow in form of an umbel at the top of the ſtalk, and are of a bright purple colour. They come out in July, and the ſeed ripens in autumn. The plant cannot be cultivated in gardens. The tops are an uſeful aperient bitter, in which view they are often uſed in the preſent practice of medicine.

GENTILE, in matters of religion, a Pagan, or worſhipper of falſe gods.

The origin of this word is deduced from the Jews, who called all thoſe who were not of their name גוים *gojim*, i. e. *gentes*, which in the Greek tranſlations of the old Teſtament is rendere τα εθνα; in which ſenſe it frequently occurs in the New Teſtament; as in Matth. vi. 32. "All theſe things the nations or Gentiles ſeek." Whence the Latin church alſo uſed *gentes* in the ſame ſenſe as our *Gentiles*, eſpecially in the New Teſtament. But the word *gentes* ſoon got another ſignification, and no longer meant all ſuch as were not Jews; but thoſe only who were neither Jews nor Chriſtians, but followed the ſuperſtitions of the Greeks and Romans, &c. In this ſenſe it continued among the Chriſtian writers, till the manner of ſpeech, together with their religion, was publicly and by authority received in the empire; when *gentiles*, from *gentes*, came into uſe: and then both words had two ſignifications, viz. in treatiſes or laws concerning religion, they ſignified Pagans, neither Jews nor Chriſtians; and in civil affairs, they were uſed for all ſuch as were not Romans.

Gentile, in the Roman law and hiſtory, a name which ſometimes expreſſes what the Romans otherwiſe called *barbarians*, whether they were allies of Rome or not: but this word was uſed in a more particular ſenſe for all ſtrangers and foreigners not ſubject to the Roman empire.

GENTILESCHI (Horatio), an Italian painter, was born at Piſa in 1563. After having made himſelf famous at Florence, Rome, Genoa, and other parts of Italy, he removed to Savoy; from whence he went to France, and at laſt, upon the invitation of Charles I. went over to England. He was well received by that king, who appointed him lodgings in his court, together with a conſiderable ſalary; and employed him in his palace at Greenwich, and other public places. The moſt remarkable of his performances in England, were the ceilings of Greenwich and York-houſe. He did alſo a Madona, a Magdalen, and Lot with his two daughters, for King Charles; all which he performed admirably well. After the death of the king, when his collection was expoſed to ſale, nine pictures of Gentileſchi were ſold for 600l. and are now ſaid to be the ornaments of the hall in Marlborough-houſe. His moſt eſteemed piece abroad was the portico of cardinal Bentivoglio's palace at Rome. He made ſeveral attempts in face-painting, but with little ſucceſs; his talent lying altogether in hiſtories, with figures as big as the life. He was much in favour with the duke of Buckingham, and many others of the nobility. After 12 years continuance in England, he died there at 84 years of age, and was buried in the queen's chapel at Somerſet-houſe. His print is among the heads of Vandyke, he having been drawn by that great maſter. He left behind him a daughter, *Artimiſia Gentileſchi*, who was but little inferior to her father in hiſtory-painting, and excelled him in portraits.

GENTILIS (Albericas), profeſſor of civil law at Oxford; an Italian by birth. He had quitted Italy with his father, on account of religion. He wrote ſeveral works; three books, in particular *De jure belli*, which have not been unſerviceable to Grotius. He died at London in 1608.

Gentilis (Scipio), brother to the former, and as celebrated a civilian as he, foreſook his native country that he might openly profeſs the Proteſtant religion. He was counſellor of the city of Nuremberg, and profeſſor of law with uncommon reputation. He was a great humaniſt; and in his lectures, as well as books, mixed the flowers of polite learning with the thorns of the law. He died in 1616.

GENTLEMAN. Under this denomination are comprehended all above the rank of yeomen*, whereby noblemen are trully called *gentlemen*.

A gentleman is uſually defined to be one, who, without any title, bears a coat of arms, or whoſe anceſtors have been freemen: and by the coat that a gentleman giveth, he is known to be, or not to be, deſcended from thoſe of his name that lived many hundred years ſince.

The word is formed of the French *gentilhomme*; or rather of *gentil*, "fine, faſhionable, or becoming;" and the Saxon *man*, q. d. *honeſtus*, or *honeſto loco natus*.—The ſame ſignification has the Italian *gentilhuomo*, and the Spaniſh *hidalgo*, or *hijo dalgo*, that is, the ſon of ſomebody, or of a perſon of note.—If we go farther back, we ſhall find *gentleman* originally derived from the Latin *gentilis homo*; which was uſed among the Romans for a race of noble perſons of the ſame name, born of free or ingenuous parents, and whoſe anceſtors had never been ſlaves or put to death by law. Thus Cicero in his *Topics*, "*Gentiles ſunt, qui inter ſe eodem ſunt nomine, ab ingenuis oriundi, quorum majorum nemo ſervitutem ſervivit, qui capite non ſunt diminuti*, &c.—Some hold that it was formed from *gentile*, i. e. pagan; and that the ancient Franks, who conquered Gaul, which was then converted to Chriſtianity, were called *gentiles* by the natives, as being yet heathens.—Others relate, that towards the declenſion of the Roman empire, as recorded by Ammianus Marcelinus, there were two companies of brave ſoldiers, the one called *gentilium*, and the other *ſcutariorum*; and that it was hence we derive the names *gentleman* and *eſquire*. See Esquire.—This ſentiment is confirmed by Paſquire, who ſuppoſes the apellation *gentiles* and *ecuyers* to have been tranſmitted to us from the Roman ſoldiery; it being to the *gentiles* and *ſcutarii*, who were the braveſt of the ſoldiery, that the principal benefices and portions of lands were aſſigned. See Benefice.—The Gauls obſerving, that during the empire of the Romans, the *ſcutarii* and *gentiles* had the beſt tenements or appointments of all the ſoldiers on the frontiers of the provinces, became inſenſibly accuſtomed to apply the ſame names, *gentilhommes* and *ecuyers*, to ſuch as they found their kings gave the beſt proviſions or appointments to.

Gentleman Uſher of the Black Rod. See Rod.

Gentlemen of the Chapel; officers whoſe duty and attendance is in the royal chapel, being in number 32. Twelve of them are prieſts; the other 20, commonly called *clerks of the chapel*, aſſiſt in the performance of divine ſervice. One of the firſt 12 is choſen for confeſſor of the houſehold; whoſe office is to read prayers every morning to the houſehold ſervants, to viſit the ſick, examine and prepare communicants, and adminiſter

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* See *Commonalty*.

niſter the ſacrament. One of 20 clerks, well verſed in muſic, is choſen firſt organiſt, who is maſter of the children, to inſtruct them in muſic, and whatever elſe is neceſſary for the ſervice of the chapel; a ſecond is likewiſe an organiſt; a third a lutaniſt; and a fourth a violiſt. There are likewiſe three vergers, ſo called from the ſilver rods they carry in their hands; being a ſerjeant, a yeoman, and groom of the veſtry: the firſt attends the dean and ſub-dean, and finds ſurplices and other neceſſaries for the chapel; the ſecond has the whole care of the chapel, keeps the pews, and ſeats the nobility and gentry; the groom has his attendance within the chapel-door, and looks after it.

GENTOOS, in modern hiſtory, according to the common acceptation of the term, denote the profeſſors of the religion of the bramins or brachmans, who inhabit the country called *Hindoſtan,* in the Eaſt Indies, from the word *ſtan,* a "region," and *hind* or *hindoo;* which Feriſhteh, as we learn from colonel Dow's tranſlation of his hiſtory, ſuppoſes to have been a ſon of Ham the ſon of Noah. It is obſerved, however, that Hindoo is not the name by which the inhabitants originally ſtyled themſelves; but according to the idiom of the *ſchanſcrit* which they uſe, *jumbodeep,* from *jumboo,* "a jackall," an animal common in their country; and *deep,* a large portion of land ſurrounded by the ſea; or *bhertekhunt,* from *khunt,* i. e. "a continent," and *bherrhut,* the name of one of the firſt Indian rajahs. It is alſo to be obſerved, that they have aſſumed the name of *Hindoos* only ſince the era of the Tartar government, to diſtinguiſh themſelves from their conquerors the Muſſulmen. The term *Gentoo* or *Gent,* in the Schanſcrit dialect, denotes *animal* in general, and in its more confined ſenſe *mankind,* and is never appropriated particularly to ſuch as follow the doctrines of Brhima. Theſe are divided into four great tribes, each of which has its own ſeparate appellation; but they have no common or collective term that comprehends the whole nation under the idea affixed by the Europeans to the word *Gentoo.* Mr Halhed, in the preface to his tranſlation of the Code of Gentoo Laws, conjectures, that the Portugueſe, on their firſt arrival in India, hearing the word frequently in the mouths of the natives, as applied to mankind in general, might adopt it for the domeſtic appellation of the Indians themſelves, or perhaps their bigotry might force from the word *Oentoo* a fanciful alluſion to Gentile or Pagan. The Hindoos, or Gentoos, vie with the Chineſe as to the antiquity of their nation. They reckon the duration of the world by four jogues, or diſtinct ages: the firſt is the Suttee jogue, or age of purity, which is ſaid to have laſted about 3,200,000 years; during which the life of man was 100,000 years, and his ſtature 21 cubits: the ſecond, the Tirtah jogue, or the age in which one-third of mankind were reprobate; which conſiſted of 2,400,000 years, when men lived to the age of 10,000 years: the third, the Dwapar jogue, in which half of the human race became depraved; which endured to 600,000 years, when men's lives were reduced to 1000 years: and fourthly, the Collee jogue, in which all mankind were corrupted, or rather diminiſhed, which the word *collee* imports. This is the preſent era, which they ſuppoſe will ſubſiſt for 400,000 years, of which near 5000 are already paſt; and man's life in this period is limited to 100 years. It is ſuppoſed by many authors, that moſt of the Gentoo *ſhaſters,* or ſcriptures, were compoſed about the beginning of the Collee jogue: but an objection occurs againſt this ſuppoſition, viz. that the ſhaſters take no notice of the deluge; to which the bramins reply, that all their ſcriptures were written before the time of Noah, and the deluge never extended to Hindoſtan. Nevertheleſs, it appears from the ſhaſters themſelves, that they claim a much higher antiquity than this; inſtances of which are recited by Mr Halhed.

The doctrine of tranſmigration is one of the diſtinguiſhing tenets of the Gentoos. With regard to this ſubject, it is their opinion, according to Mr Hollwell, that thoſe ſouls which have attained to a certain degree of purity, either by the innocence of their manners or the ſeverity of their mortifications, are removed to regions of happineſs proportioned to their reſpective merits; but that thoſe who cannot ſo far ſurmount the prevalence of bad example, and the powerful degeneracy of the times, as to deſerve ſuch a promotion, are condemned to undergo continual puniſhment in the animation of ſucceſſive animal forms, until, at the ſtated period, another renovation of the four jogues ſhall commence, upon the diſſolution of the preſent. They imagine ſix different ſpheres above this earth; the higheſt of which, called *ſuttee,* is the reſidence of Bhrima and his particular favourites. This ſphere is alſo the habitation of thoſe men who never uttered a falſehood, and of thoſe women who had voluntarily burned themſelves with their huſbands; the propriety of which practice is expreſsly enjoined in the code of the Gentoo laws. This code, printed by the Eaſt-India Company in 1776, is a very curious collection of Hindoo juriſprudence, which was ſelected by the moſt experienced pundits or lawyers, from curious originals in the Schanſcrit language, who were employed for this purpoſe from May 1773 to February 1775; afterwards tranſlated into the Perſian idiom, and then into the Engliſh language by Mr Halhed.

The ſeveral inſtitutes contained in this collection are interwoven with the religion of the Gentoos, and revered as of the higheſt authority. The curious reader will diſcover an aſtoniſhing ſimilarity between the inſtitutes of this code and many of the ordinances of the Jewiſh law; between the character of the bramins or prieſts, and the Levites; and between the ceremony of the ſcape-goat under the Moſaic diſpenſation, and a Gentoo ceremony called the *aſhummed jug,* in which a horſe anſwers the purpoſe of the goat. Many obſolete cuſtoms and uſages alluded to in many parts of the Old Teſtament, may alſo receive illuſtrations from the inſtitutes of this code. It appears from the code, that the bramins, who are the prieſts and legiſlators of the country, have reſigned all the ſecular and executive power into the hands of another caſt or tribe; and no bramin has been properly capable of the magiſtracy ſince the time of the ſuttee jogue. The only privilege of importance which they have appropriated to themſelves, is an exemption from all capital puniſhment: they may be degraded, branded, impriſoned for life, are ſent into perpetual exile; but it is every where expreſsly ordained, that a bramin ſhall not be put to death on any account whatever.

We have already obſerved, that the Hindoos are divided into four great and original tribes, which, according to the Gentoo theology, proceeded from the four different members of Brhima, the ſuppoſed immediate agent of the creation under the ſpirit of the Almighty. Theſe tribes are the bramins, which proceeded from his mouth, and whoſe office is to pray, read, and inſtruct; the Chehteree, which proceed from his arms, whoſe office is to draw the bow, to fight, and to govern; the Bice, proceeding from the belly or thighs, who are to provide the neceſſaries of life by agriculture and traffic; and the Sooder, from the feet, which are ordained to labour, ſerve, and travel.

Few Chriſtians, ſays the tranſlator of the Gentoo code, have expreſſed themſelves with a more becoming reverence of the grand and impartial deſigns of Providence in all its works, or with a more extenſive charity towards all their fellow-creatures of every profeſſion, than the Gentoos. It is indeed an article of faith among the bramins, that God's all merciful power would not have permitted ſuch a number of different religions, if he had not found a pleaſure in beholding their varieties.

GENUFLEXION, (of *genu*, "knee," and *flecto* "I bend,") the act of bowing or bending the knee; or rather of kneeling down.

The Jeſuit Roſweyd, in his Onomaſticon, ſhows, that genuflexion, or kneeling, has been a very ancient cuſtom in the church, and even under the Old Teſtament diſpenſation; and that this practice was obſerved throughout all the year, excepting on Sundays, and during the time from Eaſter to Whitſuntide, when kneeling was forbid by the council of Nice.

Others have ſhown, that the cuſtom of not kneeling on Sundays had obtained from the time of the apoſtles, as appears from St Irenæus, and Tertullian; and the Ethiopic church, ſcrupulouſly attached to the ancient ceremonies, ſtill retains that of not keeling at divine ſervice. The Ruſſians eſteem it an indecent poſture to worſhip God on the knees. Add, that the Jews uſually prayed ſtanding. Roſweyd gives the reaſons of the prohibition of genuflexion on Sundays, &c. from St Baſil, Anaſtaſius, St Juſtin, &c.

Baronius is of opinion, that genuflexion was not eſtabliſhed in the year of Chriſt 58, from that paſſage in Acts xx. 36. where St Paul is expreſsly mentioned to kneel down at prayer; but Saurin ſhows, that nothing can be thence concluded. The ſame author remarks, alſo, that the primitive Chriſtians carried the practice of genuflexion ſo far, that ſome of them had worn cavities in the floor where they prayed: and St Jerome relates of St James, that he had contracted a hardneſs on his knees equal to that of camels.

GENUS, among metaphyſicians and logicians, denotes a number of beings which agree in certain general properties common to them all: ſo that a genus is nothing elſe but an abſtract idea, expreſſed by ſome general name or term. See LOGIC and METAPHYSICS.

GENUS, is alſo uſed for a character or manner applicable to every thing of a certain nature or condition: in which ſenſe it ſerves to make capital diviſions in divers ſciences, as medicine, natural hiſtory, &c.

GENUS, in rhetoric. Authors diſtinguiſh the art of rhetoric, as alſo orations or diſcourſes produced thereby, into three genera or kinds, demonſtrative, deliberative, and judiciary. To the demonſtrative kind belong panegyrics, genethliacons, epithalamiums, funeral harrangues, &c. To the deliberative kind belong perſuaſions, diſſuaſions, commendations, &c. To the judiciary kind belong defences and accuſations.

GENUS, in medicine. See MEDICINE, under the *Noſology*.

GENUS, in natural hiſtory, a ſubdiviſion of any claſs or order of natural beings, whether of the animal, vegetable, or mineral kingdoms, all agreeing in certain common characters. See BOTANY and ZOOLOGY.

GENUS, in muſic, by the ancients called *genus melodiæ*, is a certain manner of dividing and ſubdividing the principles of melody; that is, the conſonant and diſſonant intervals, into their concinnous parts.

The moderns conſidering the octave as the moſt perfect of intervals, and that whereon all the concords depend, in the preſent theory of muſic, the diviſion of that interval is conſidered as containing the true diviſion of the whole ſcale.

But the ancients went to work ſomewhat differently: the diateſſaron, or fourth, was the leaſt interval which they admitted as concord; and therefore they ſought firſt how that might be moſt conveniently divided; from whence they conſtituted the diapente and diapaſon.

The diateſſaron being thus, as it were, the root and foundation of the ſcale, what they called the *genera*, or kinds, aroſe from its various diviſions; and hence they defined the *genus modulandi* to be the manner of dividing the tetrachord and diſpoſing its four ſounds as to ſucceſſion.

The genera of muſic were three, the enharmonic, chromatic, and diatonic. The two firſt were variouſly ſubdivided: and even the laſt, though that is commonly reckoned to be without any ſpecies, yet different authors have propoſed different diviſions under that name, without giving any particular names to the ſpecies as was done to the other two.

For the characters, &c. of theſe ſeveral genera, ſee ENHARMONIC, CHROMATIC, and DIATONIC.

GEOCENTRIC, in aſtronomy, is applied to a planet, or its orbit, to denote it concentric with the earth, or as having the earth for its centre, or the ſame centre with the earth.

GEOFFRÆA, in botany: A genus of the decandria order, belonging to the diadelphia claſs of plants; and in the natural method ranking under the 32d order, *Papilionaceæ*. The calyx is quinquefid, the fruit an oval plum; the kernel compreſſed. There is only one ſpecies, viz. the inermis, or cabbage-bark tree, which is a native of Braſil and Jamaica. The wood of this tree is uſed in building; but it is chiefly valued for its bark, which is adminiſtered as an anthelmintic medicine. From this medical property it is alſo called the *worm-bark tree*. This bark is of a grey colour externally, but black and furrowed on the inſide. It has a mucilaginous and ſweetiſh taſte, and a diſagreeable ſmell. It is given in caſes of worms, in form of powder, decoction, ſyrup, and extract. The decoction is preferred; and is made by ſlowly boiling an ounce of the freſh dried bark in a quart of water, till it aſ-

Plate CCXXI.

ſume the colour of Madeira wine. This ſweetened the ſyrup; evaporated, it forms an extract. It commonly produces ſome ſickneſs and purging; ſometimes violent effects, as vomiting, delirium, and fever. Theſe laſt are ſaid to be owing to an over-doſe, or to drinking cold water; and are relieved by the uſe of warm-water, caſtor oil, or a vegetable acid. It ſhould always be begun in ſmall doſes. But when properly and cautiouſly adminiſtered, it is ſaid to operate as a very powerful anthelmintic, particularly for the expulſion of the lumbrici, which are a very common cauſe of diſeaſe in the Weſt-India iſlands; and there it is very frequently employed. But it has we believe been but little uſed in Britain.

GEOFFREY of MONMOUTH, biſhop of St Aſaph, called by the ancient biographers *Gallofridus Monumetenſis*. Leland conjectures that he was educated in benedictine convent at Monmouth, where he was born; and that he became a monk of that order. Bale, and after him Pits call him archdeacon of Monmouth; and it is generally aſſerted that he was made biſhop of St Aſaph in the year 1151 or 1152, in the reign of king Stephen. His hiſtory was probably finiſhed after the year 1138. It contains a fabulous account of Britiſh kings, from the Trojan Brutus to the reign of Cadwallader in the year 690. But Geoffrey, whatever cenſure he may deſerve for his credulity, was not the inventor of the ſtories he relates. It is a tranſlation from a manuſcript written in the Britiſh language, and brought to England from Armorica by his friend Gualter, archdeacon of Oxford. But the atchievements of king Arthur, Merlin's prophecies, many ſpeeches and letters, were chiefly his own addition. In excuſe for this hiſtorian, Mr Wharton judiciouſly obſerves, that fabulous hiſtories were then the faſhion, and popular traditions a recommendation to his book.

GEOFFROY (Stephen Francis), a celebrated phyſician, botaniſt, and chemiſt, born at Paris in 1672. After having finiſhed his ſtudies, he travelled into England, Holland, and Italy. In 1704, he received the degree of doctor of phyſic at Paris; and at length became profeſſor of chemiſtry, and phyſician of the Royal College. He was a member of the Royal Society of London, and of the Academy of Sciences. He wrote, 1. Several very curious Theſes in Latin, which were afterwards tranſlated into French. 2. An excellent treatiſe intitled *Tractatus de Materia Medica, ſive de Medicamentorum ſimplicium hiſtoria, virtue, delectu, et uſu*. He died at Paris, in 1731.

GEOGRAPHICAL MILE, the ſame with the ſea mile; being one minute, or the 60th part of a degree of a great circle on the earth's ſurface.

GEOGRAPHY.

GEOGRAPHY (γεωγραφεια, from γη *terra*, and γραφω *ſcribo*); the doctrine or knowledge of the earth, but as in itſelf, and as to its affections; or a deſcription of the terreſtrial globe, and particularly of the known and inhabitable parts thereof, with all its different diviſions. See EARTH and ASTRONOMY.

SECT. I. *Hiſtory of the Science.*

AT what time the Science of geography began firſt to be ſtudied among mankind is entirely uncertain. It is generally agreed, that the knowledge of it was derived to the Greeks, who firſt of the European nations cultivated this ſcience, from the Egyptians or Babylonians; but it is impoſſible to determine which of theſe two nations had the honour of the invention. Herodotus tells us, that the Greeks firſt learned the pole, the gnomon; and the 12 diviſions of the day, from the Babylonians. By Pliny, and Diogenes Laertius, however, we are told, that Thales of Miletus firſt found out the paſſage of the ſun from tropic to tropic; which he could not have done without the aſſiſtance of a gnomon. He is ſaid to have been the author of two books, the one on the tropic, and the other on the equinox; both of which he probably determined by the gnomon; and by this he was led to the diſcovery of the four ſeaſons of the year, which are determined by the ſolſtices and equinoxes.

1
Seaſons of the year diſcovered by Thales,

Thales divided the year into 365 days; which was undoubtedly a method diſcovered by the Egyptians, and communicated by them to him. It is ſaid to have been invented by the ſecond Mercury, ſurnamed *Triſmegiſtus*, who, according to Euſebius, lived about 50 years after the *Exodus*. Pliny tells us expreſsly, that this diſcovery was made by obſerving when the *ſhadow returned to its marks*; a clear proof that it was done by the gnomon. Thales alſo knew the method of determining the height of bodies by the length of their ſhadows, as appears by his propoſing this method for meaſuring the height of the Egyptian pyramids. Hence many learned men have been of opinion, that as the uſe of the gnomon was known in Egypt long before the dawn of learning in Greece, the pyramids and obeliſks, which to common travellers appeared only to be buildings of magnificence, were in reality as many ſun-dials on a very large ſcale, and built with a deſign to aſcertain the ſeaſon of the year, by the variation of the length of their ſhadows: and, in confirmation of this opinion, it was found by M. Chazelles in 1694, that the two ſides, both of the larger and ſmaller pyramids, ſtood exactly north and ſouth; ſo that, even at this day, they form true meridian lines.

Conjecture concerning the uſe of the Egyptain pyramids and obeliſks.

From the days of Thales, who flouriſhed in the ſixth century before Chriſt, very little ſeems to have been done towards the eſtabliſhment of geography for 200 years. During this period, there is only one aſtronomical obſervation recorded; namely, that of Meton and Euctemon, who obſerved the ſummer ſolſtice at Athens, during the archonſhip of Apſeudes, on the 21ſt of the Egyptian month Phamenoth, in the morning, being the 27th of June 432 B. C. This obſervation was made by watching narrowly the ſhadow of the gnomon, and was done with a deſign to fix the beginning of their cycle of 19 years.

3
Longitudes and latitudes determined,

Timocharus and Ariſtillus, who began to obſerve about 295 B. C. ſeem to have been the firſt who attempted

tempted to fix the longitudes and latitudes of the fixed ſtars, by conſidering their diſtances from the equator. One of their obſervations gave riſe to the diſcovery of the preceſſion of the equinoxes, which was firſt obſerved by Hipparchus about 150 years after; and he made uſe of Timocharis and Ariſtillus's method, in order to delineate the parallels of latitude, and the meridians on the ſurface of the earth; thus laying the foundation of the ſcience of geography as we have it at preſent.

But though the latitudes and longitudes were thus introduced by Hipparchus, they were not attended to by any of the intermediate aſtronomers till the days of Ptolemy. Strabo, Vitruvius, and Pliny, have all of them entered into a minute geographical deſcription of the ſituation of places, according to the length of the ſhadows of the gnomon, without taking the leaſt notice of the degrees and minutes of longitude and latitude.

4
Accounts of the ancient maps.

The diſcovery of the longitudes and latitudes immediately laid a foundation for making maps, or delineations of the ſurface of the earth *in plano*, on a very different plan from what had been attempted before. Formerly the maps were little more than rude outlines and topographical ſketches of different countries. The earlieſt were thoſe of Seſoſtris, mentioned by Euſtathius; who ſays, that "this Egyptian king, having traverſed great part of the earth, recorded his march in maps, and gave copies of his maps not only to the Egyptians, but to the Scythians, to their great aſtoniſhment."—Some have imagined, that the Jews made a map of the Holy Land, when they gave the different portions to the nine tribes at Shiloh; for Joſhua tells us, that they were ſent to walk through the land, and that they *deſcribed it in ſeven parts in a book*; and Joſephus tells us, that when Joſhua ſent out people from the different tribes to meaſure the land, he gave them, as companions, perſons well ſkilled in geometry, who could not be miſtaken in the truth.

The firſt Grecian map on record is that of Anaximander, mentioned by Strabo, lib. i. p. 7. It has been conjectured by ſome, that this was a general map of the then known world, and is imagined to be the one referred to by Hipparchus under the deſignation of the *ancient map*. Herodotus minutely deſcribes a map made by Ariſtagoras tyrant of Miletus, which will ſerve to give us ſome idea of the maps of thoſe ages. He tells us, that Ariſtagoras ſhowed it to Cleomenes king of Sparta, with a view of inducing him to attack the king of Perſia, even in his palace at Suſa, in order to reſtore the Ionians to their ancient liberty. It was traced upon braſs or copper, and contained the intermediate countries which were to be traverſed in that march. Herodotus tells us, that it contained "the whole circumference of the earth, the whole ſea or ocean, and all the rivers:" but theſe words muſt not be underſtood literally. From the ſtate of geography at that time, it may be fairly concluded that by the *ſea* was meant no more than the Mediterranean; and therefore, the earth or land ſignified the coaſts of that ſea, and more particularly the Leſſer Aſia, extending towards the middle of Perſia. The rivers were the Halys, the Euphrates, and Tigris, which Herodotus mentions as neceſſary to be croſſed in that expedition. It contained one ſtraight line, called the *Royal Highway*, which took in all the ſtations or places of encampment from Sardis to Suſa. Of theſe there were 111 in the whole journey, containing 13,500 ſtadia, or $1687\frac{1}{4}$ Roman miles of 5000 feet each.

These itinerary maps of the places of encampment were indiſpenſably neceſſary in all armies. Athenæus quotes Bæton as author of a work intitled, *The encampments of Alexander's march*; and likewiſe Amyntas to the ſame purpoſe. Pliny tells us, that Diognetus and Bæton were the ſurveyors of Alexander's marches, and then quotes the exact number of miles according to their menſuration; which he afterwards confirms by the letters of Alexander himſelf. It likewiſe appears, that Alexander was very careful in examining the meaſures of his ſurveyors, and took care to employ the moſt ſkilful in every country for this purpoſe. The ſame author alſo acquaints us, that a copy of this great monarch's ſurveys was given by Xenocles his treaſurer to Patrocles the geographer, who, as Pliny informs us, was admiral of the fleets of Seleucus and Antiochus. His book on geography is often quoted both by Strabo and Pliny; and it appears, that this author furniſhed Eratoſthenes with the principal materials for conſtructing his map of the oriental part of the world.

5
Parallel of latitude how drawn at firſt.

Eratoſthenes was the firſt who attempted to reduce geography to a regular ſyſtem, and introduced a regular parallel of latitude. This was traced over certain places where the longeſt day was of the ſame length. He began it from the ſtraits of Gibraltar; and it thence paſſed through the Sicilian ſea, and near the ſouthern extremities of Peloponneſus. From thence it was continued through the Iſland of Rhodes and the bay of Iſſus; and there entering Cilicia, and croſſing the rivers Euphrates and Tigris, it was extended to the mountains of India. By means of this line, he endeavoured to rectify the errors of the ancient map, ſuppoſed to be that of Anaximander. In drawing this parallel, he was regulated by obſerving where the longeſt day was fourteen hours and an half, which Hipparchus afterwards determined to be the latitude of 36 degrees.

6
Attempts to determine the extent of the earth's circumference.

The firſt parallel through Rhodes was ever afterwards conſidered with a degree of preference, like the foundation ſtone of all ancient maps; and the longitude of the then known world was often attempted to be meaſured in ſtadia and miles, according to the extent of that line, by many ſucceeding geographers. Eratoſthenes ſoon after attempted not only to draw other parallels of latitude, but alſo to trace a meridian at right angles to theſe, paſſing through Rhodes and Alexandria, down to Syene and Meroë; and as the progreſs he thus made tended naturally to enlarge his ideas, he at laſt undertook a ſtill more arduous taſk, namely, to determine the circumference of the globe, by an actual meaſurement of a ſegment of one of its great circles. To find the meaſure of the earth is indeed a problem which has probably engaged the attention of aſtronomers and geographers ever ſince the globular figure of it was known. Anaximander is ſaid to have been the firſt among the Greeks who wrote upon this ſubject. Archytas of Tarentum, a Pythagorean, famous for his ſkill in mathematics and mechanics, is ſaid alſo to have made ſome attempts in this way; and Dr Long conjectures, that theſe are the

7
Moſt ancient opinions on this ſubject.

8
Method uſed by Eratoſthenes.

the authors of the moſt ancient opinion that the circumference of the earth is 400,000 ſtadia. Ariſtarchus of Samos is thought to have conſidered the magnitude of the earth as well as of the ſun and moon. Archimedes makes mention of the ancients who held the circumference of the earth to be 30,000 ſtadia; but it does not appear what methods were made uſe of by theſe very ancient geographers to ſolve the problem. Probably they attempted it by obſervations of ſtars in the zenith or in the horizon, and actual menſuration from ſome part of the circumference of the earth. A proof of this we have from what Ariſtotle writes in his treatiſe *De Cælo*; that we have different ſtars paſs through our zenith, according as our ſituation is more or leſs northerly; and that in the ſouthern parts of the earth we have ſtars come above our horizon, which if we go northward will no longer be viſible to us. Hence it appears, that there are two ways of meaſuring the circumference of the earth; one by obſerving ſtars which paſs through the zenith of one place, and do not paſs through that of another; the other, by obſerving ſome ſtars which come above the horizon of one place, and are obſerved at the ſame time to be in the horizon of another. Eratoſthenes at Alexandria in Egypt made uſe of the former method. He knew that at the ſummer ſolſtice the ſun was vertical to the inhabitants of Syene, a town on the confines of Ethiopia, under the tropic of Cancer, where they had a well built for that purpoſe, on the bottom of which the rays of the ſun fell perpendicularly the day of the ſummer ſolſtice: he obſerved by the ſhadow of a wire ſet perpendicularly in an hemiſpherical baſon, how much the ſun was on the ſame day at noon diſtant from the zenith of Alexandria; and found that diſtance to be one-50th part of a great circle in the heavens. Suppoſing then Syene and Alexandria to be under the ſame meridian, he concluded the diſtance between them to be the 50th part of a great circle upon the earth; and this diſtance being by meaſure 5000 ſtadia, he concluded the circumference of the earth to be 250,000 ſtadia; but as this number divided by 360 would give $694\frac{4}{9}$ ſtadia to a degree, either Eratoſthenes himſelf or ſome of his followers aſſigned the round number 700 ſtadia to a degree; which multiplied by 360, makes the circumference of the earth 252,000 ſtadia; whence both theſe meaſures are given by different authors as that of Eratoſthenes.

9
By Poſidonius.

In the time of Pompey the Great, Poſidonius made an attempt to meaſure the circumference of the earth by the method of horizontal obſervations. He knew that the ſtar called *Canopus* was but juſt viſible in the horizon of Rhodes, and that at Alexandria its meridian height was the 48th part of a great circle in the heavens, or $7\frac{1}{2}$ deg., which ſhows what part of a great circle upon the earth the diſtance between thoſe places amounts to. Suppoſing them both to be under the ſame meridian, and the diſtance between them to be 5000 ſtadia, the circumference of the earth will be 240,000 ſtadia; which is the firſt meaſure of Poſidonius. According to Strabo, Poſidonius made the meaſure of the earth to be 180,000 ſtadia, at the rate of 500 ſtadia to a degree. The reaſon of this difference is thought to be, that Eratoſthenes meaſured the diſtance between Rhodes and Alexandria, and found it to be but 3750 ſtadia: taking this for a 48th part of the earth's circumference, which is the calculation of Poſidonius, the whole circumference will be 180,000 ſtadia. This meaſure was received by Marinus of Tyre, and is uſually aſcribed to Ptolemy. Poſidonius's method, however, is found to be exceedingly erroneous, on account of the uncertainty of refraction in the ſtars which are near the horizon. Caſſini remarks, that taking exactly the mean betwixt the laſt dimenſions of Eratoſthenes and Poſidonius, a degree of a great circle upon the earth will be 600 ſtadia, and a minute of a degree 10 ſtadia, which is juſt a mile and a quarter of the ancient Roman meaſure and a mile of the modern meaſure.

10
By the khalif Almamun.

Several geographers after the time of Eratoſthenes and Poſidonius have made uſe of the different heights of the pole in diſtant places under the ſame meridian to find the dimenſions of the earth. About the year 800, the khalif Almamun had the diſtance meaſured of two places two degrees aſunder, and under the ſame meridian, in the plains of Sirjar near the Red Sea. The reſult of the matter was, that the mathematicians employed found the degree at one time to conſiſt of 56 miles, at another of $56\frac{1}{3}$, or, as ſome will have it, $56\frac{2}{3}$ miles.

11
By Fernelius.

The next attempt to find the circumference of the earth was in 1525 by Fernelius, a learned French phyſician. To attain his purpoſe, he took the height of the pole at Paris, going from thence directly northwards, until he came to the place where the height of the pole was one degree more than at the city. The length of the way was meaſured by the number of revolutions made by one of the wheels of his carriage; and after proper allowances for the declivities and turnings of the road, he concluded that 68 Italian miles were equal to a degree on the earth.

12
By Snellius.

Snellius, an eminent Dutch mathematician, ſucceeded Fernelius in his attempts to meaſure the circumference of the earth. Having taken the heights of the pole at Alcmaer and at Bergen-op-zoom, he found the difference to be 1° 11′ 30″. He next meaſured the diſtance betwixt the parallels of theſe two places, by taking ſeveral ſtations and forming triangles; by means of which he found the degree to conſiſt of 341,676 Leyden feet. Having meaſured the diſtance betwixt the parallels of Alcmaer and Leyden, which differ only half a degree in their latitude, the calculation came out 342,120 Leyden feet to a degree. Hence he aſſigned the round number 342,000 Leyden feet to a degree; which, according to Picard, amounts to 55,021 French toiſes.

13
Mr. Norwood's calculation.

In 1635, Mr Norwood, an Engliſhman, took the elevations of the pole at London and at York; and having meaſured the diſtance betwixt the two parallels, aſſigned $69\frac{1}{2}$ miles and two poles to a degree; each pole being reckoned $16\frac{1}{2}$ feet.

14
Calculations by Ricciolus.

15
By the French academicians.

After the year 1654, Ricciolus made uſe of ſeveral methods to determine the circumference of the earth; from all which he concluded, that one degree contained 64,363 Bologna paces, which are equivalent to 61,650 French toiſes. The moſt remarkable attempt, however, was that of the French mathematicians, who employed teleſcopic ſights for the purpoſe, which had never been done before. Theſe are much the beſt; as by them the view may be directed to an object at a greater diſtance, and towards any point with more certainty;

certainly; whence the triangles for meaſuring diſtances may be formed with greater accuracy than otherwiſe can be done. In conſequence of this improvement, the fundamental baſe of their operations was much longer than that made uſe of by Snellius or Ricciolus. The diſtance meaſured was between the parallels of Sourdon and Malvoiſine; between which the difference of the polar altitude is ſomewhat more than one degree; and the reſult of the whole was, that one degree contained 57,060 French toiſes. As this problem can be the more accurately determined in proportion to the length of the meridian line meaſured, the members of the Royal Academy prolonged theirs quite acroſs the kingdom of France, meaſuring it trigonometrically all the way. This work was begun in the year 1683, but was not finiſhed till 1718. They made uſe of Picard's fundamental baſe, as being meaſured with ſufficient accuracy; and an account of the whole was publiſhed by Caſſini in the year 1720. In this work ſome miſtakes were detected in the calculations of Snellius; and it was likewiſe ſhown, that there are errors in thoſe of Ricciolus, owing principally to the latter having taken too ſhort a fundamental baſe, and not having paid ſufficient attention to the effects of refraction. Though Snellius, however, had made ſome miſtakes in his calculations, there is no reaſon to doubt the accuracy of his obſervations. Holland, by reaſon of its flatneſs, is the fitteſt country in Europe for meaſuring an arc of the meridian; and Snellius had an uncommon opportunity of obſerving the exactneſs of his fundamental baſe, *viz.* the diſtance betwixt one tower at Leyden and another at Souterwode. A froſt happened juſt after the country round Leyden had been overflowed; by which means he was enabled to take two ſtations upon the ice; the diſtance between which he carefully meaſured, three times over; and then from theſe ſtations he obſerved the angles which the viſual rays pointing at thoſe towers made with the ſtraight line upon the ice. From theſe conſiderations profeſſor Muſchenbroek, was induced to make new calculations and form triangles upon the fundamental baſe of Snellius, which he did in the year 1700; and from theſe he aſſigns 57,033 toiſes to a degree, which is only 27 leſs than had been done by the academicians.

16
Inaccuracy of the ancient maps.

The inveſtigation of this problem of the circumference of the earth was eſſentially neceſſary for determining the radical principles of all maps; that of Eratoſthenes, though the beſt of which antiquity can boaſt, was nevertheleſs exceedingly imperfect and inaccurate. It contained little more than the ſtates of Greece, and the dominions of the ſucceſſors of Alexander, digeſted according to the ſurveys abovementioned. He had ſeen, indeed, and has quoted, the voyages of Pytheas into the great Atlantic ocean, which gave him ſome faint idea of the weſtern parts of Europe: but ſo imperfect, that they could not be realiſed into the outlines of a chart. Strabo tells us, that he was extremely ignorant of Gaul, Spain, Germany, and Britain. He was equally ignorant of Italy, the coaſts of the Adriatic, Pontus, and all the countries towards the north. We are alſo told by the ſame author, that Eratoſthenes made the diſtance between Epidamnus or Dyrrhachium on the Adriatic, and the bay of Thermæ on the Ægean ſea, to be only 900 ſtadia, when in reality it was above 2000; and in another inſtance, he had enlarged the diſtance from Carthage to Alexandria to 15,000 ſtadia, when in reality it was no more than 9000.

Such was the ſtate of geography and the nature of the maps prior to the time of Hipparchus; who made a cloſer connection between geography and aſtronomy, by determining the longitudes and latitudes from celeſtial obſervations. It muſt be owned, however, that the previous ſteps to this new projection of the ſphere had been in a great meaſure made eaſy by Archimedes, upwards of 50 years before the time of Hipparchus, when he invented his noble theorems for meaſuring the ſurface of a ſphere and its different ſegments.

It appears that war has been generally the occaſion of making the moſt accurate maps of different countries; and therefore geography made great advances from the progreſs of the Roman arms. In all the provinces occupied by that people, we find that camps were every where conſtructed at proper intervals, and roads were raiſed with ſubſtantial materials, for making an eaſier communication between them; and thus civilization and ſurveying were carried on according to ſyſtem throughout the extent of that large empire. Every new war produced a new ſurvey and itinerary of the countries where the ſcenes of action paſſed; ſo that the materials of geography were accumulated by every additional conqueſt. Polybius tells us, that at the beginning of the ſecond Punic war, when Hannibal was preparing his expedition againſt Rome, the countries through which he was to paſs were carefully meaſured by the Romans. Julius Cæſar cauſed a general ſurvey of the Roman empire to be made, by a decree of the ſenate. Three ſurveyors, Zonodoxus, Theodotus, and Polyclitus, had this taſk aſſigned them, and are ſaid to have completed it in 25 years. The Roman itineraries that are ſtill extant, alſo ſhow what care and pains they had been at in making ſurveys in all the different provinces of their empire; and Pliny has filled the third, fourth, and fifth books of his Natural Hiſtory with the geographical diſtances that were thus meaſured. We have likewiſe another ſet of maps ſtill preſerved to us, known by the name of the *Peutingerian Tables*, publiſhed by Welſer and Bertius, which give a ſufficient ſpecimen of what Vegetius calls the *Itinera Picta*, for the clearer direction of their armies in their march.

The Roman empire had been enlarged to its greateſt extent, and all its provinces well known and ſurveyed, when Ptolemy, in the reign of Antoninus Pius, about 150 years after Chriſt, compoſed his ſyſtem of geography. The principal materials he made uſe of for compoſing this work, were *the proportions of the gnomon to its ſhadow*, taken by different aſtronomers at the times of the equinoxes and ſolſtices; calculations founded upon the length of the longeſt days; the meaſures or computed diſtance of the principal roads contained in their ſurveys and itineraries; and the various reports of travellers and navigators, who often determined the diſtances of places by hearſay and conjecture. All theſe were compared together, and digeſted into one uniform body or ſyſtem: and afterwards were tranſlated by him into a new mathematical language, expreſſing the different degrees of longitude and latitude, according to the invention of

Hipparchus, but which Ptolemy had the merit of carrying into full practice and execution, after it had been neglected for upwards of 250 years. With ſuch imperfect and inaccurate materials, it is no wonder to find many errors in Ptolemy's ſyſtem. Neither were theſe errors ſuch as had been introduced in the more diſtant extremities of his maps, but even in the very centre of that part of the world which was the beſt known to the ancient Greeks and Romans, and where all the famed ancient aſtronomers had made their obſervations.—Yet this ſyſtem, with all its imperfections, continued in vogue till the beginning of the preſent century. The improvements in geography which at that time, and ſince, have taken place, were owing to the great progreſs made in aſtronomy by ſeveral eminent men who lived during that period. More correct methods and inſtruments for obſerving the latitude were found out; and the diſcovery of Jupiter's ſatellites afforded a much eaſier method of finding the longitudes than was formerly known. The voyages made by different nations alſo, which were now become much more frequent than formerly, brought to the knowledge of the Europeans a vaſt number of countries utterly unknown to them before. The late voyages of Captain Cooke, made by order of his Britannic Majeſty, have contributed more to the improvement of geography than any thing that has been done during the preſent century; ſo that now the geography of the utmoſt extremities of the earth is in a fair way of being much better known to the moderns than that of the moſt adjacent countries was to the ancients. This, however, muſt be underſtood only of the ſea-coaſts of theſe countries; for, as to their internal geography, it is leſs known now than before, except in a very few places.

17 Geography ſtill imperfect.

On the whole, it may be obſerved, that geography is a ſcience even yet far from perfection. The maps of America and the eaſtern parts of Aſia are, perhaps, more unfiniſhed than any of the reſt. Even the maps of Great Britain and Ireland are very imperfect and unſatisfactory; and the numbers we have of them, varied, and republiſhed, without any real improvement, juſtly confirm an obſervation made by Lord Bacon, namely, that an opinion of plenty is one of the cauſes of want. The late Dr Bradley was of opinion, that there were but two places in England whoſe longitude might be depended upon as accurately taken; and that theſe were the obſervatory at Greenwich, and Serburn-caſtle the ſeat of the earl of Macclesfield in Oxfordſhire; and that their diſtance was one degree in ſpace, or four minutes in time. Even this was found to be inaccurate, the diſtance in time being obſerved by the late tranſit of Venus to be only three minutes and 47 ſeconds. It were well, however, if there were no greater errors with regard to other places: but if we examine the longitude of the Lizard, we ſhall find ſcarce any two geographers that agree concerning it; ſome making it 4° 40′ from London; others 5°, and 5° 14′; while ſome enlarge it to 6°. Our beſt maps are therefore ſtill to be conſidered as unfiniſhed works, where there will always be many things to be added and corrected, as different people have an opportunity.

Sect. II. *Principles and Practice of Geography.*

18 Proofs of the round figure of the earth.

The fundamental principles of geography are, the ſpherical figure of the earth; its rotation on its axis; its revolution round the ſun; and the poſition of the axis or line round which it revolves, with regard to the celeſtial luminaries. That the earth and ſea taken together conſtitute one vaſt ſphere, is demonſtrable by the following arguments. 1. To people at ſea, the land diſappears, though near enough to be viſible were it not for the intervening convexity of the water. 2. The higher the eye is placed, the more extenſive is the proſpect; whence it is common for ſailors to climb up to the tops of the maſts to diſcover land or ſhips at a diſtance. But this would give them no advantage were it not for the convexity of the earth; for, upon an infinitely extended plane objects would be viſible at the ſame diſtance whether the eye were high or low; nor would any of them vaniſh till the angle under which they appeared became too ſmall to be perceptible. 3. To people on ſhore, the maſt of a ſhip at ſea appears before the hull; but were the earth an infinite plane, not the higheſt objects, but the biggeſt, would be longeſt viſible; and the maſt of a ſhip would diſappear by reaſon of the ſmalneſs of its angle long before the hull did ſo. 4. The convexity of any piece of ſtill water of a mile or two extent may be perceived by the eye. A little boat, for inſtance, may be perceived by a man who is any height above the water; but if he ſtoops down and lays his eye near the ſurface, he will find that the fluid appears to riſe and intercept the view of the boat entirely. 5. The earth has been often ſailed round; as by Magellan, Drake, Dampier, Anſon, Cook, and many other navigators; which demonſtrates that the ſurface of the ocean is ſpherical; and that the land is very little different, may eaſily be proved from the ſmall elevation of any part of it above the ſurface of the water. The mouths of rivers which run 1000 miles are not more than one mile below their ſources; and the higheſt mountains are not quite four miles of perpendicular height: ſo that, though ſome parts of the land are elevated into hills, and others depreſſed into valleys, the whole may ſtill be accounted ſpherical. 6. An undeniable and indeed ocular demonſtration of the ſpherical figure of the earth is taken from the round figure of its ſhadow which falls upon the moon in the time of eclipſes. As various ſides of the earth are turned towards the ſun during the time of different phenomena of this kind, and the ſhadow in all caſes appears circular, it is impoſſible to ſuppoſe the figure of the earth to be any other than ſpherical. The inequalities of its ſurface have no effect upon the earth's ſhadow on the moon; for as the diameter of the terraqueous globe is very little leſs than 8000 miles, and the height of the higheſt mountain on earth not quite four, we cannot account the latter any more than the 2000th part of the former; ſo that the mountains bear no more proportion to the bulk of the earth, than grains of duſt bear to that of a common globe.

19 Phenomena reſulting from the globular figure of the earth.

A great many of the terreſtrial phenomena depend upon the globular figure of the earth, and the poſition of its axis with regard to the ſun; particularly the riſing and ſetting of the celeſtial luminaries, the length of the days and nights, &c. A general explanation of theſe is given under the article Astronomy; but ſtill it belongs to geography to take notice of the difference betwixt the ſame phenomena in different parts of the earth. Thus, though the ſun riſes and ſets all over the world, the circumſtances of his doing ſo are very different in different countries. The moſt remarkable of theſe circumſtances is the duration of the light not only of the ſun himſelf, but of the twilight before he riſes and after he ſets. In the equatorial regions, for inſtance, darkneſs comes on very ſoon after ſun-ſet; becauſe the convexity of the earth comes quickly in between the eye of the obſerver and the luminary, the motion of the earth being much more rapid there than any where elſe. In Britain the twilight always continues two hours or thereabouts, and during the ſummer-ſeaſon it continues in a conſiderable degree during the whole night. In countries farther to the northward or ſouthward, the twilight becomes brighter and brighter as we approach the pole, until at laſt the ſun does not appear to touch the horizon, but goes in a circle at ſome diſtance above it for many days ſucceſſively. In like manner, during the winter, the ſame luminary ſinks lower and lower, until at laſt he does not appear at all; and there is only a dim twinkling of twilight for an hour or two in the middle of the day. By reaſon of the refraction of the atmoſphere, however, the time of darkneſs, even in the moſt inhoſpitable climates, is always leſs than that of light; and ſo remarkable is the effect of this property, that in the year 1682, when ſome Dutch navigators wintered in Nova Zembla, the ſun was viſible to them 16 days before he could have been ſeen above the horizon had there been no atmoſphere, or had it not been endowed with any ſuch power. The reaſon of all this is, that in the northern and ſouthern regions only a ſmall part of the convexity of the globe is interpoſed betwixt us and the ſun for many days, and in the high latitudes none at all. In the warmer climates the ſun has often a beautiful appearance at riſing and ſetting, by reaſon of the refraction of his light through the vapours which are copiouſly raiſed in thoſe parts. In the colder regions, halos, parhelia, aurora borealis, and other meteors, are frequent; the two former owing to the great quantity of vapour continually flying from the warm regions of the equator to the colder ones of the poles. The aurora borealis is owing to the electrical matter imbibed by the earth from the ſun in the warm climates, and going off through the upper regions of the atmoſphere to the place from whence it came. In the high northern latitudes, thunder and lightning are unknown, or but ſeldom heard of; but the more terrible phenomena of earthquakes, volcanoes, &c. are by no means unfrequent. Theſe, however, ſeem only to affect iſlands and the maritime parts of the continent. See the articles Earthquake and Volcano.

Notwithſtanding the ſeeming inequality in the diſtribution of light and darkneſs, however, it is certain, that throughout the whole world there is nearly an equal proportion of light diffuſed on every part, abſtracting from what is abſorbed by clouds, vapours, and the atmoſphere itſelf. The equatorial regions have indeed the moſt intenſe light during the day, but the nights are long and dark; while, on the other hand, in the northerly and ſoutherly parts, though the ſun ſhines leſs powerfully, yet the length of time that he appears above the horizon, with the greater duration of the twilight, makes up for the ſeeming deficiency.

Were the earth a perfect plane, the ſun would appear to be vertical in every part of it: For in compariſon with the immenſe magnitude of that luminary, the diameter of this globe itſelf is but very ſmall: and as the ſun, were he near to us, would do much more than cover the whole earth; ſo, though he were removed to any diſtance, the whole diameter of the latter would make no difference in the apparent angle of his altitude. By means of the globular figure of the earth alſo, along with the great diſparity between the diameters of the two bodies, ſome advantage is given to the day over the night: for thus the ſun, being immenſely the larger of the two, ſhines upon more than one half of the earth; whence the unenlightened part has a ſhorter way to go before it again receives the benefit of his rays. This difference is greater in the inferior planets Venus and Mercury than the earth.

To the globular figure of the earth likewiſe is owing the long moon-light which the inhabitants of the polar regions enjoy, the general reaſon of which is given under the article Astronomy, nº 373. The ſame thing likewiſe occaſions the appearance and diſappearance of certain ſtars at ſome ſeaſons of the year in ſome countries; for were the earth flat, they would all be viſible in every part of the world at the ſame time. Hence moſt probably has ariſen the opinion of the influence of certain ſtars upon the weather and other ſublunary matters. In ſhort, on the globular figure of the earth depends the whole preſent appearance of nature around us; and were the ſhape of the planet we inhabit to be altered to any other, beſides the *real* differences which would of conſequence take place, the *apparent* ones would be ſo great that we cannot form any idea of the face which nature would then preſent to us.

20
Circles ſuppoſed to be drawn on the earth's ſurface

In geography the circles which the ſun apparently deſcribes in the heavens are ſuppoſed to be extended as far as the earth, and marked on its ſurface; and in like manner we may imagine as many circles as we pleaſe to be deſcribed on the earth, and their planes to be extended to the celeſtial ſphere, till they mark concentric ones on the heaven. The moſt remarkable of theſe ſuppoſed by geographers to be deſcribed in this manner are the following.

21
Horizon.

1. *The Horizon.* This is properly a double circle, one of the horizons being called the *ſenſible*, and the other the *rational*. The former comprehends only that ſpace which we can ſee around us upon any part of the earth; and which is very different according to the difference of our ſituation. The other, called the *rational*, is a circle parallel to the former, and paſſing through the centre of the earth ſuppoſed to be continued as far as the celeſtial ſphere itſelf. To the eyes of ſpectators, there is always a vaſt difference between the ſenſible and rational horizons; but by reaſon of the immenſe diſparity betwixt the ſize of the earth and celeſtial ſphere, planes of both circles may be conſidered as coincident. Hence, in geography, when the horizon, or plane of the horizon is ſpoken of, the ra-

tional is always underſtood, when nothing is ſaid to the contrary. By reaſon of the round figure of the earth, every part has a different horizon. The poles of the horizon, that is, the points directly above the head, and oppoſite to the feet of the obſerver, are called the *zenith* and *nadir*.

22 Vertical circles or azimuths.

23 Exact method of obſerving the altitudes of the ſun or moon.

2. A great circle deſcribed upon the ſphere of the heaven, and paſſing through the two vertical points, is called a *vertical circle*, or an azimuth ; and of theſe we may ſuppoſe as many as we pleaſe all round the horizon. Sometimes they are alſo called *ſecondaries* of the horizon ; and in general any great circle, drawn through the poles of another, is called its *ſecondary*. In geography every circle obtains the epithet of *great* whoſe plane paſſes through the centre of the earth ; in other caſes they are called *leſſer circles*. The altitudes of the heavenly bodies are meaſured by an arch of the azimuth or vertical circle intercepted between the horizon and the body itſelf. The method of taking them is explained under the article Astronomy, n° 379 ; but a more accurate method with regard to the ſun and moon, is for two perſons to make their obſervations at the ſame time ; one of them to obſerve the altitude of the upper limb, the other of the lower limb of the luminary ; the mean betwixt theſe two giving the true height of the centre. The ſame thing may alſo be done accurately by one obſerver, having the apparent diameter of the luminary given. For, having found the height of the upper edge of the limb by the quadrant, take from it half his diameter, the remainder is the height of his centre ; or having found the altitude of his lower edge, add to it half the diameter, and the ſum is the height of the centre as before. When the obſervations are made with a large inſtrument, it will be convenient to uſe a ſextant, or ſixth part of a circle, rather than a quadrant, as being leſs unwieldy.

24 Almucantars.

25 Apparent diſtances of celeſtial bodies how meaſured.

3. *Almucantars* are circles ſuppoſed to be drawn upon the ſphere parallel to the horizon, and grow leſs and leſs as they approach the vertical points, where they entirely vaniſh. The apparent diſtances betwixt any two celeſtial bodies are meaſured by ſuppoſing arches of great circles drawn through them, and then finding how many degrees, minutes, &c. of theſe circles are intercepted between them. The apparent diameter of the ſun's diſk is found by a circle of diſtance drawn through the centre of it ; and the number of minutes continued between the two oppoſite points of that part of the circle which paſſes through the centre is the meaſure of the apparent diameter. The apparent diameter of the ſun may be found by two obſervers, one taking the altitude of the upper, and the other of the lower edge of the limb ; the difference betwixt the two being the diameter required ; or,

26 Senſible horizon defined.

27 Depreſſion of the horizon of the ſea.

Plate CCXI.

4. Sometimes the viſible horizon is conſidered only with regard to the objects which are upon the earth itſelf ; in which caſe we may define it to be a leſſer circle on the ſurface of the earth, comprehending all ſuch objects as are at once viſible to us ; and the higher the eye, the more is the viſible horizon extended. It is moſt accurately obſerved, however, on the ſea, on account of the abſence of thoſe inequalities which at land render the circle irregular ; and for this reaſon it is called ſometimes the horizon of the ſea ; and may be obſerved by looking through the ſights of a quadrant at the moſt diſtant part of the ſea then viſible. In making this obſervation, the viſual rays A D and AE, fig. 2. will, by reaſon of the ſpherical ſurface of the ſea, always point a little below the true ſenſible horizon SS ; and conſequently below the rational horizon which is parallel to it, and ſuppoſed to be coincident with it. The quadrant ſhows the depreſſion of the horizon of the ſea below the true horizon ; and it is obvious from the figure, that the higher the eye is, the greater muſt this depreſſion be. The depreſſion of the horizon of the ſea, however, is not always the ſame, even though there be no variation in the height of the eye. The difference indeed is but ſmall, amounting only to a few ſeconds, and is owing to a difference in the atmoſphere, which ſometimes refracts more than at others. Without refraction, the viſual ray would be AE, and in that caſe E is the moſt diſtant point which could be ſeen ; but by refraction, the ray FG, coming from the point G, may be ſeen at F, ſo as to go on from thence in the line FA ; and then the view is extended as far as G, and the depreſſion of the horizon of the ſea is in the line AF, which points higher than AE, but extends the view farther. From an inſpection of the figure it is evident, that if the refraction were greater, the view would be extended ſtill farther, as to M ; though the depreſſion of the horizon of the ſea would then be leſs, as is ſhown by the line ALM: whence alſo it appears, that by reaſon of the difference of refraction in the air, our horizon is ſometimes more extenſive than at others.

28 Equator.

5. The *equator* is a great circle upon the earth, every part of which is equally diſtant from the poles or extremities of the imaginary line on which the earth revolves. In the ſea-language it is uſually called the *line*, and when people ſail over it they are ſaid to croſs the line.

29 Meridians.

6. The *meridian* of any place is a great circle on the earth drawn through that place and both poles of the earth. It cuts the horizon at right angles, marking upon it the true north and ſouth points ; dividing alſo the globe into two hemiſpheres called the *eaſtern* and *weſtern* from their relative ſituation to that place and to one another. The poles divide the meridians into two ſemicircles ; one of which is drawn through the place to which the meridian belongs, the other through that point of the earth which is oppoſite to the place. By the meridian of a place geographers and aſtronomers often mean that ſemicircle which paſſes through the place ; and which may therefore be called the *geographical meridian*. All places lying under this ſemicircle are ſaid to have the ſame meridian ; the ſemicircle oppoſite to this is called the *oppoſite meridian*. The meridians are thus immoveably fixed to the earth as much as the places themſelves on its ſurface ; and are carried along with it in its diurnal rotation. When the geographical meridian of any place is, by the rotation of the earth, brought to point at the ſun, it is noon or mid-day at that place ; in which caſe, were the plane of the circle extended, it would paſs through the middle of the luminary's diſk. Suppoſing the plane of the meridians to be extended to the ſphere of the fixed ſtars, in that caſe, when by the rotation of the earth the meridian comes to any point in the heavens, then, from the apparent motion of the heavens, that point is ſaid to come to the meridian. The rotation of the earth is from weſt to eaſt ; whence the celeſtial bodies appear to move the con-

trary way. Eaſt and weſt, however, are terms merely relative; ſince a place may be weſt from ſome part of the earth, and eaſt from another; but the true eaſt and weſt points from any place are thoſe where its horizon cuts the equator.

30
True eaſt and weſt points.

31
Longitude and firſt meridian.

7. All places lying under the ſame meridian are ſaid to have the ſame *longitude*, and thoſe which lie under different meridians to have different longitudes; the difference of longitude being reckoned eaſtward or weſtward on the equator. Thus if the meridian of any place cuts the equator in a point 15 degrees diſtant from another, we ſay there is a difference of 15° longitude betwixt theſe two places. Geographers uſually pitch upon the meridian of ſome remarkable place for the firſt meridian; and reckon the longitude of all others by the diſtance of their meridians from that which they have pitched upon as the firſt; meaſuring ſometimes eaſtward on the equator all round the globe, or ſometimes only one half eaſt and the other weſt; according to which laſt meaſurement, no place can have more than 180° longitude either eaſt or weſt. By the ancient Greek geographers the firſt meridian was placed in *Hera* or *Junonia*, one of the *Fortunate Iſlands* as they were then called; which is ſuppoſed to be the preſent iſland of Teneriffe, one of the Canaries. Theſe iſlands being the moſt weſterly part of the earth then known, were on that account made the ſeat of the firſt meridian, the longitude of all other places being counted eaſtward from them. The Arabians, ambitious of having the firſt meridian taken from them, fixed it at the moſt weſterly part of the continent of Africa. Some later geographers placed the firſt meridian in the iſland of Corvo, one of the Azores (A); becauſe at that time the magnetic needle on the iſland juſt mentioned pointed due north without any variation; and it was not then known that the needle itſelf was ſubject to variation, as has ſince been diſcovered. Bleau replaced the firſt meridian in the iſle of Teneriffe; and to aſcertain the place more exactly, cauſed it to paſs through the famous mountain of that iſland, called the *peak* from *el-pico*, 'a bird's beak." Among modern geographers, however, it is now become cuſtomary for each to make the firſt meridian paſs through the capital of his own country; a practice, however, which is certainly improper, as it is thus impoſſible for the geographers of one nation to underſtand the maps of another without a troubleſome calculation, which anſwers no purpoſe. By the Britiſh geographers the royal obſervatory at Greenwich is accounted the place of the firſt meridian.

32
Hour circles.

8. If we ſuppoſe 12 great circles, one of which is the meridian to a given place, to interſect each other at the poles of the earth, and divide the equator into 24 equal parts, theſe are the *hour-circles* of that place. Theſe are by the poles divided into 24 ſemicircles, correſponding to the 24 hours of the day and night. The diſtance betwixt each two of theſe ſemicircles is 15°, being the 24th part of 360; and by the rotation of the earth, each ſucceeding ſemicircle points at the ſun one hour after the preceding; ſo that in 24 hours all the ſemicircles point ſucceſſively at the ſun. Hence it appears that ſuch as have their meridian 15° eaſt from any other, have likewiſe noon one hour ſooner, and the contrary; and in like manner every other hour of the natural day is an hour ſooner at the one place than at the other. Hence, from any inſtantaneous appearance in the heavens obſerved at two diſtant places, the difference of longitude may be found, if the hour of the day be known at each place. Thus the beginning of an eclipſe of the moon, when the luminary firſt touches the ſhadow of the earth, is an inſtantaneous appearance, as alſo the end of an eclipſe of this kind when the moon leaves the ſhadow of the earth, viſible to all the inhabitants on that ſide of the globe. If therefore we find, that at any place an eclipſe of the moon begins an hour ſooner than at another, we conclude that there is a difference of 15° of longitude between the two places. Hence alſo were a man to travel or ſail round the earth from weſt to eaſt, he will reckon one day more to have paſſed than they do who ſtay at the place from whence he ſet out; ſo that their Monday will be his Tueſday, &c. On the other hand, if he ſails weſtward, he will reckon a day leſs or be one day in the week later, than thoſe he leaves behind.

33
Of the latitude.

9. The equator divides the earth into two hemiſpheres called the *northern* and *ſouthern*: all places lying under the equator are ſaid to have no latitude; and all others to have north or ſouth latitude according to their ſituation with reſpect to the equator. The *latitude* itſelf is the diſtance from the equator meaſured upon the meridian, in degrees, minutes, and ſeconds. The complement of latitude is the difference between the latitude itſelf and 90°, or as much as the place itſelf is diſtant from the pole; and this complement is always equal to the elevation of the equator above the horizon of the place. The elevation of the pole of any place is equal to the latitude itſelf.

34
Of a parallel ſphere.

An inhabitant of the earth who lives at either of the poles, has always one of the celeſtial poles in his zenith and the other in his nadir, the equator coinciding with the horizon: hence all the celeſtial parallels are alſo parallel to the horizon; whence the perſon is ſaid to live in a parallel ſphere, or to have a parallel horizon.

35
Right ſphere.

Thoſe who live under the equator have both poles in the horizon, all the celeſtial parallels cutting the horizon at right angles; whence they are ſaid to live in a right-ſphere, or to have a right horizon.

36
Oblique ſphere.

Laſtly, thoſe who live between either of the poles and the equator are ſaid to live in an oblique ſphere or to have an oblique horizon; becauſe the celeſtial equator cuts his horizon obliquely, and all the parallels in the celeſtial ſphere have their planes oblique to that of the horizon. In this ſphere ſome of the parallels interſect the horizon at oblique angles, ſome are entirely above it, and ſome entirely below it; all of them, however, ſo ſituated, that they would obliquely interſect the plane of the horizon extended.

37
Arctic and antarctic circle.

The largeſt parallel which appears entire above the horizon of any place in north latitude is called by the ancient aſtronomers the *arctic circle* of that place; within

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(A) Theſe iſlands had their name form the number of goſhawks found there; the word *azor* in Spaniſh ſignifying a "goſhawk."

within this circle, *i. e.* between it and the arctic pole, are comprehended all the ſtars which never ſet in that place, but are carried perpetually round the horizon in circles parallel to the equator. The largeſt parallel which is hid entire below the horizon of any place in north latitude was called the *antarctic circle* of that place by the ancients. This circle comprehends all the ſtars which never riſe in that place, but are carried perpetually round below the horizon in circles parallel to the equator. In a parallel ſphere, however, the equator may be conſidered as both *arctic* and *antarctic* circle; for being coincident with the horizon, all the parallels on one ſide are entirely above it, and thoſe on the other entirely below it. In an oblique ſphere, the nearer any place is to either of theſe poles, the larger are the arctic and antarctic circles, as being nearer to the celeſtial equator, which is a great circle. In a right ſphere, the arctic and antarctic circles have no place; becauſe no parallel appears either entirely above or below it. By the arctic and antarctic circles, however, modern geographers in general underſtand two fixed circles at the diſtance of 23½ degrees from the pole. Theſe are ſuppoſed to be deſcribed by the poles of the ecliptic, and mark out the ſpace all round the globe where the ſun appears to touch the horizon at midnight in the ſummer time, and to be entirely ſunk below it in the winter. Theſe are alſo called the *polar circles*. By the ancients the arctic circle was called *maximus ſemper apparentium*, and *circulus perpetuæ apparitionis*; the antarctic circle, on the other hand, being named *maximus ſemper occultorum*, and *circulus perpetuæ occultationis*.

38 Appearances to the inhabitants of a parallel, right, and oblique ſphere.

According to the different poſitions of the globe with regard to the ſun, the celeſtial bodies will exhibit different phenomena to the inhabitants. Thus, in a parallel ſphere, they will appear to move in circles round the horizon; in a right ſphere, they would appear to riſe and ſet as at preſent, but always in circles cutting the horizon at right angles; but in an oblique ſphere, the angle varies according to the degree of obliquity, and the poſition of the axis of the ſphere with regard to the ſun. The phenomena thence ariſing will be ſufficiently underſtood from what is ſaid under the article Astronomy, n° 345, &c. From thence we will eaſily perceive the reaſon of the ſun's continual change of place in the heavens: but though it is certain that this change takes place every moment, the vaſt diſtance of the luminary renders it imperceptible for ſome time, unleſs to very nice aſtronomical obſervers. Hence we may generally ſuppoſe the place of the ſun to be the ſame for a day or two together, though in a conſiderable number of days it becomes exceedingly obvious to every body. When he appears in the celeſtial equator, his motion appears for ſome time to be in the plane of that circle, though it is certain that his place there is only for a ſingle moment; and in like manner, when he comes to any other point of the heavens, his apparent diurnal motion is in a parallel drawn throughout. Twice a-year he is in the equator, and then the days and nights are nearly equal all over the earth. This happens in the months of March and September; after which the ſun proceeding either northward or ſouth, according to the ſeaſon of the year and the poſition of the obſerver, the days become longer or ſhorter than the nights, and ſummer or winter come on, as is fully explained under the article Astronomy.

39 Sun's declination.

The ſeceſſion of the ſun from the equator either northward or ſouthward is called his *declination*, and is either north or ſouth according to the ſeaſon of the year; and when this declination is at its greateſt height, he is then ſaid to be in the tropic, becauſe he begins to turn back (the word *tropic* being derived from the Greek *τρεπω verto*).

40 Of the tropics, &c.

The ſpace between the two tropics, called the *torrid zone*, extends for no leſs than 47 degrees of latitude all round the globe; and throughout the whole of that ſpace the ſun is vertical to ſome of the inhabitants twice a-year, but to thoſe who live directly under the tropics only once. Throughout the whole torrid zone alſo there is little difference between the length of the days and nights. The ancient geographers found themſelves conſiderably embarraſſed in their attempts to fix the northern tropic; for though they took a very proper method, namely, to obſerve the moſt northerly place where objects had no ſhadow on a certain day, yet they found that on the ſame day no ſhadow was caſt for a ſpace of no leſs than 300 ſtadia. The reaſon of this was, the apparent diameter of the ſun; which being about half a degree, ſeemed to extend himſelf over as much of the ſurface of the earth, and to be vertical every where within that ſpace.

When the ſun is in or near the equator, he ſeems to change his place in the heavens moſt rapidly; ſo that about the equinoxes one may very eaſily perceive the difference in a day or two; but as he approaches the tropics this apparent change becomes gradually ſlower; ſo that for a number of days he ſcarce ſeems to move at all. The reaſon of this may be eaſily be underſtood from any map on which the ecliptic is delineated: for by drawing lines through every degree of it parallel to the equator, we ſhall perceive them gradually approach nearer and nearer each other, until at laſt, when we approach the point of contact betwixt the ecliptic and tropic, they can for ſeveral degrees ſcarce be diſtinguiſhed at all.

41 Diviſion of the earth's ſurface into climates.

From an obſervation of the diverſity in the length of the days and nights, the riſing and ſetting of the ſun, with the other phenomena already mentioned, the ancient geographers divided the ſurface of the earth into certain diſtricts which they called *climates*; and inſtead of the method of deſcribing the ſituation of places by their latitude and longitude as we do now, they contented themſelves with mentioning the climate in which they were ſituated. When more accuracy was required, they mentioned alſo the beginning, middle, and ending of the climates. This diſtinction, however, was certainly very vague and inaccurate: for the only method they had for determining the difference was by the length of the day; and a climate according to them, was ſuch a ſpace as had the day in its moſt northerly part half an hour longer than in the moſt ſoutherly. For the beginning of their firſt climate they took that parallel under which the day is twelve hours and three quarters long, thoſe parts of the world which lie nearer the equator not being ſuppoſed to be in any climate; either becauſe in a looſe ſenſe they may be conſidered as in a right ſphere, or becauſe they were unknown, or thought to be uninhabitable by reaſon of the heat. The northern climates were generally ſuppoſed to be ſeven; which muſt have an equal number of ſouthern climates correſponding with them. The names of the northern climates, according to the ancients, were as follow: 1. Meroe. 2. Syene in Egypt. 3. Alexandria in Egypt. 4. Rhodes. 5. Rome; or, according to others, a parallel drawn through the Helleſpont. 6. The parallel paſſing through the mouth of the river Boriſthenes. 7. The Riphean mountains.—Each of theſe places was ſuppoſed to be in the middle of the climate; and as the ſouthern parts of the globe were then very little known, the climates to the ſouthward of the equator were ſuppoſed to be as far diſtant from that circle as the northern ones; in conſequence of which they took their names from the latter.

A parallel was ſaid to paſs through the middle of a climate when the day under that parallel is a quarter of an hour longer than that which paſſes through the moſt ſoutherly part. Hence it does not divide the ſpace into two equal parts, but that part next the equator will always be the larger of the two; becauſe the farther we recede from that circle, the leſs increaſe of latitude will be ſufficient to lengthen the day a quarter of an hour. Thus, in every climate there are three parallels; one making the beginning, the ſecond, the middle, and the third the ending of the climate; the ending of one being always the beginning of another. Some of the ancients divided the earth by theſe parallels; others by a parallel did not mean a mere line, but a ſpace of ſome breadth: and hence the parallel may be underſtood as the ſame with half a climate.

This method of dividing the ſurface of the earth into climates, though now very much diſuſed, has been adopted by ſeveral modern geographers. Some of theſe begin their climates at the equator, reckoning them by the increaſe of half an hour in the length of the day northward. Thus they go on till they come to the polar circles, where the longeſt day is 24 hours: betwixt theſe and the poles they count the climates by the increaſe of a natural day in the length of time that the ſun continues above the horizon, until they come to one where the longeſt day is 15 of ours, or half a month; and from this to the pole they count by the increaſe of half months or whole months, the climates ending at the poles where the days are ſix months long. The climates betwixt the equator and the polar circles are called *hour-climates*, and thoſe between the polar circles and the poles are called *month-climates*.—In common language, however, we take the word *climate* in a very different ſenſe; ſo that, when two countries are ſaid to be in different climates, we underſtand only that the temperature of the air, ſeaſons, &c. are different.

42
Different names given to people from the poſition of their ſhadows.

From the difference in the length and poſitions of the ſhadows of terreſtrial ſubſtances, ancient geographers have given different terms to the inhabitants of certain places of the earth; the reaſon of which will be eaſily underſtood from the following conſiderations. 1. Since the ſun in his apparent annual revolution never removes farther from the equator than 23½ degrees, it follows, that none of thoſe who live without that ſpace, or beyond the tropics, can have the luminary vertical to them at any ſeaſon of the year. 2. All who live between the tropics have the ſun vertical twice a-year, though not all at the ſame time. Thus, to thoſe who live directly under the equator, he is directly vertical in March and September at the time of the equinox. If a place is in 10° north latitude, the ſun is vertical when he has 10° north declination; and ſo of every other place. 3. All who live between the tropics have the ſun at noon ſometimes north and ſometimes ſouth of them. Thus, they who live in a place ſituated in 20° north latitude, have the ſun at noon to the northward when he has more than 20 degrees north declination, and to the ſouthward when he has leſs. 4. Such of the inhabitants of the earth as live without the tropics, if in the northern hemiſphere, have the ſun at noon to the ſouthward of them, but to the northward if in the ſouthern hemiſphere. 5. When the ſun is in the zenith of any place, the ſhadow of a man or any upright object falls directly upon the place where they ſtand, and conſequently is inviſible; whence the inhabitants of ſuch places were called *Aſcii*, or without ſhadows: thoſe who live between the tropics, and have the ſun ſometimes to the north and ſometimes to the ſouth of them, have of conſequence their ſhadows projecting north at ſome ſeaſons of the year and ſouth at others; whence they were called *Araphiſcii*, or having two kinds of ſhadows. They who live without the tropics have their noon ſhadows always the ſame way; and are therefore called *Heteroſcii*, that is, having only one kind of ſhadow. If they are in north latitude, the ſhadows are always turned towards the north; and if in the ſouthern hemiſphere, towards the ſouth. When a place is ſo far diſtant from the equator that the days are 24 hours long or longer, the inhabitants were called *Periſcii*, becauſe their ſhadows turn round them.

43
Names from the parallels of latitude or diſtance of places.

Names have likewiſe been impoſed upon the inhabitants of different parts of the earth from the parallels of latitude under which they live, and their ſituation with regard to one another. Thus, when two places are ſo near each other that the inhabitants have only one horizon, or at leaſt that there is no perceptible difference between them, the inhabitants were called *Synæci*, that is, near neighbours; the ſeaſons, days, nights, &c. in both places being perfectly alike. Thoſe who lived at diſtant places, but under the ſame parallel, were called *Periæci*, that is, living in the ſame circle. Thoſe who are on the ſame ſide of the equator have the ſeaſons of the year at the ſame time; but if on different ſides, the ſummer ſeaſon of the one is the winter of the other, as is fully explained under the article Astronomy. Some writers, however, by the name of *Periæci*, diſtinguiſh thoſe who live under oppoſite points of the ſame parallel, where the noon of one is the midnight of the other. When two places lie under parallels equally diſtant from the equator, but in oppoſite hemiſpheres, the inhabitants were called *Antæci*. Theſe have a ſimilar increaſe of days and nights, and ſimilar ſeaſons, but in oppoſite months of the year. According to ſome, the Antæci were ſuch as lived under the ſame geographical meridian, and had day and night, at the ſame time. If two places are in parallels equally diſtant from the equator, and in oppoſite meridians, the inhabitants were called *Antichthones* with reſpect to one another, that is, living on oppoſite ſides of the earth; or *Antipodes*, that is, having their feet oppoſite to one another. When two perſons are Antipodes, the zenith of the one is the nadir,

nadir of the other. They have a like elevation of the pole, but it is of different poles: they have alſo days and nights alike, and ſimilar ſeaſons of the year; but they have oppoſite hours of the day and night, as well as ſeaſons of the year. Thus, when it is mid-day with us, it is midnight with our Antipodes; when it is ſummer with us, it is winter with them, &c.

44 **Diviſion of the earth into zones.**

From the various appearances of the ſun, and the effects of his light and heat upon different parts of the earth, the diviſion of it into *zones* has ariſen. Theſe are five in number. 1. The torrid zone, lying between the two tropics for a ſpace of 47° of latitude. This is divided into two equal parts by the equator; and the inhabitants have the ſun vertical to them twice a-year, excepting only thoſe who dwell under the tropics, to whom he is vertical only once, as has already been explained. 2. The two temperate zones lie between the polar circles and the tropics, containing a ſpace of 43° of latitude. And, 3. The two frigid zones lie between the polar circles and the poles. In theſe laſt the longeſt day is never below 24 hours, in the temperate zones it is never quite ſo much, and in the torrid zone it has never above 14. The zones are named from the degree of heat they were ſuppoſed to be ſubjected to. The torrid zone was ſuppoſed by the ancients to be uninhabitable by reaſon of its heat; but this is now found to be a miſtake, and many parts of the temperate zones are more intolerable in this reſpect than the torrid zone itſelf. Towards the polar circles, alſo, theſe zones are intolerably cold during the winter ſeaſon. Only a ſmall part of the northern frigid zone, and none of the ſouthern, is inhabited. Some geographers reckoned ſix zones, dividing the torrid zone into two by the equator.

45 **Right or left hand explained in geography, &c.**

When any parts of the heaven or earth are ſaid to be on the right or left, we are to underſtand the expreſſion differently according to the poſition of the perſon who makes uſe of it; becauſe according to that his face is ſuppoſed to be turned towards a certain quarter. A geographer is ſuppoſed to ſtand with his face to the north, becauſe the northern part of the world is beſt known. An aſtronomer looks towards the ſouth, to obſerve the celeſtial bodies as they come to the meridian. The ancient augurs, in obſerving the flight of birds, looked towards the eaſt; while the poets look towards the *Fortunate Iſles*. In books of geography, therefore, by the right hand we muſt underſtand the eaſt; in thoſe of aſtronomy, the weſt; in ſuch as relate to augury, the ſouth; and in the writings of poets, the north.

46 **Directions for drawing a meridian line.**

Under the article ASTRONOMY, n° 376, *et ſeq.* the method of drawing a meridian line is fully explained; the knowledge of which is abſolutely neceſſary both for geographers and aſtronomers. To what is mentioned there we ſhall only add further, that the time for drawing a line of this kind is when the ſun is nearly at the ſummer ſolſtice; becauſe the difference of declination is then ſcarce perceptible for ſeveral days, and in the few hours requiſite for the operation may be totally diſregarded. The winter ſolſtice would do equally well, were it not that the ſun is then ſo low in the heavens that a difference in the refraction might cauſe a conſiderable error in the reſult. The motion of the luminary above the horizon is likewiſe ſo oblique, that he changes his vertical faſter than his altitude, which is inconvenient in an operation where we are to determine the vertical by the altitude. A clear day muſt be choſen for the purpoſe; and the ground on which the ſhadow falls ought to be white, that the ſhadow may be the better defined. The ſtile ought not to be too high, becauſe then the top of the ſhadow will be indiſtinct; neither ought it to terminate in a point, for the ſame reaſon. Dr Long recommends the top of it to be about an eighth of an inch thick. Having drawn a meridian line upon one plane, we may draw one upon another by the following method: Hang a thread with a plummet exactly over the ſouth end of the meridian line given, and another on the plane on which the meridian line is to be drawn. Let one perſon obſerve at noon the moment when the ſhadow of the firſt thread falls exactly upon the meridian given, and let another obſerver at the ſame time mark two diſtant points in the ſhadow of the ſecond thread: a line drawn through theſe points is the meridian line required. Thus alſo a meridian line may be drawn upon a ſouth wall by marking two points in the ſhadow of a thread hung at a little diſtance from it. If the meridians are near, he that obſerves the ſhadow of the firſt thread may let the other know the moment it falls upon the meridian line by ſaying, *Now*; if far diſtant, it ſhould be done by the motion of the hand, becauſe ſound takes up ſome time in paſſing from one place to another. A quadrant or other aſtronomical inſtrument may now be fixed in the meridian line in ſuch a manner as to be capable of different elevations, in order to obſerve the altitudes of the different celeſtial bodies; the plane of that ſide of the inſtrument on which the degrees are marked being all the while kept in the meridian. The mural arc in the Royal Obſervatory at Greenwich is a wall of black marble; one ſide of which, ſtanding exactly in the plane of the meridian, has a large and accurately divided braſs quadrant fixed to it, moveable round its centre, and with teleſcope ſights. See ASTRONOMY, n° 497. At ſea, where they cannot have a meridian line, the greateſt height of a ſtar or the ſun is taken for the meridian height.

47 **Method uſed in drawing the meridian line through France.**

Having got a meridian line by either of the methods mentioned under the article ASTRONOMY, it may be prolonged to what length we pleaſe, and the diſtance of it meaſured. The meridian of the royal obſervatory at Paris being found, and an inſtrument with teleſcopic ſights placed vertically therein, the north and ſouth points of the viſible horizon were obſerved through the ſights, and a pillar erected upon the north point; then, by another inſtrument placed horizontally, ſeveral diſtant objects, as ſteeples, &c. were viewed, and the angles which the uſual lines made with the meridian line were obſerved. From the places of theſe new objects, then, others were obſerved; and where natural objects were deficient, they ſet up large poles. Thus ſeveral triangles were formed along the meridian: and in order to meaſure thoſe triangles, a paved way from *Villejuive* to *Juviſy* was made choice of for the fundamental baſe, as lying in a ſtraight line from north to ſouth. For the actual menſuration of this way, two poles were made uſe of, each of them four toiſes in length, and made of two pikeſtaves joined together at the great ends by a ſcrew. One of the meaſuring poles was firſt laid upon the ground;

ground ; the other was joined to it end to end along by a rope ſtretched from north to ſouth : the firſt pole was then taken up and laid down at the end of the ſecond, and ſo on ſucceſſively ; and for the greater eaſe in keeping the account, the meaſurer who laid down the ſecond pole had ten little ſtakes given him, one of which he ſtuck into the ground at the end of his pole every time he laid it down ; ſo that every ſtake marked eight toiſes ; the whole, when ſtuck into the ground marking 80 toiſes. Thus the length of the road abovementioned was twice meaſured, and found to be 5663 toiſes and 4 feet in going, and 5663 toiſes and 1 foot in returning ; ſo that as a greater exactneſs could not be hoped for, 5663 toiſes were pitched upon as the true length of this fundamental baſe. This is repreſented fig. 5. by the line OP ; and the calculations of the triangles upon it were made in the following manner. (Plate CCXI.) The angle COP was obſerved from O, one end of the baſe ; from the other end the angle OPC ; and from the ſtation C, the angle OCP : and thus all the angles of the triangle CPO, and the length of one ſide OP, being known, the lengths of the remaining ſides OC and PC were found by calculation. The next ſtep was to obſerve all the angles of the triangle OBC, and from thence, and the known length of the ſide OC, to calculate the other ſide OB and BC. Then all the angles being obſerved, and the ſide BC being known of the triangle ABC, which may be called the firſt or principal triangle of the meridian of the obſervatory, the other ſides AB and AC were found. Then, from one of the ſides now known, and the angles obſerved, all the ſides of the next adjoining triangle CBE were found. Thus they proceeded from one triangle to another to the place where the meridian ended in the ſouth part of France ; and there the laſt triangle was terminated by a baſe of the length of 7246 toiſes, which was actually meaſured in order to verify the preceding operations. The meridian line of Paris being prolonged in the manner juſt now deſcribed, the ſituation of ſeveral other places in France was determined by trigonometry, and an accurate map of the country drawn, eſpecially of thoſe parts which lie near the meridian of Paris.

48
To obſerve the tranſits, altitudes, &c. of the heavenly bodies.

Having found a meridian line, the tranſits or paſſages of the heavenly bodies acroſs it may be obſerved by hanging two threads with plummets exactly over it, at a little diſtance from one another, which conſequently will be directly in the plane of the meridian : if you place your eye cloſe to one of the threads in ſuch a manner that you make it cover the other, and both appear as one thread, when a ſtar is behind the threads, it is in the meridian. By the ſame method the ſun may be viewed through a ſmoaked glaſs : when the threads paſs through his centre he is in the meridian. But the beſt way of obſerving either the ſun, moon, ſtars, or planets, is through a teleſcope placed in the meridian, with two croſs hairs, one of which is in a vertical, the other in an horizontal poſition. The ſun is in the meridian when the vertical hair paſſes through his centre.

To find the elevation of the pole in any place, take the greateſt and leaſt height of ſome ſtar which never ſets, the middle height between theſe extremes is the elevation of the pole. Or the elevation of the pole may be found by one obſervation of the height of a ſtar in the meridian, if the declination of that ſtar be known ; for as the diſtance from the pole is the complement of its diſtance from the equator, this being ſubtracted from the greateſt height of the ſtar, leaves the elevation of the pole deſired. The ſame thing may be done by obſerving the leaſt height of a ſtar, and adding to that the diſtance from the pole: but for obſervations of this kind we ought to chooſe the time when the ſtars are in the zenith, and not pitch upon any who happen to be near the horizon ; becauſe the refraction occaſions ſuch errors as are too conſiderable not to affect the obſervations materially.

The height of the equator is found by taking the height of the ſun or a ſtar when we know by an almanack they have no declination ; or it may be otherwiſe known by taking the meridian height of the ſun, and adding or ſubtracting the known declination. Having found the height of the equator, we know the elevation of the pole ; or, having found the elevation of the pole, we know that of the equator, the one being the complement of the other.

49
Method of taking altitudes by a gnomon.

A method much uſed by the ancients was that of taking the altitudes of the celeſtial bodies by means of a gnomon, or upright pillar erected for this purpoſe. Thus the height of the pole and the ſeaſons of the year might be known by obſerving the length of the meridian ſhadow, which would be greater or leſs according to the altitude of the ſun at that time. The moſt ancient obſervations of this kind were thoſe made by Pytheas in the time of Alexander the Great, at Marſeilles in France, by which he found the meridian length of the ſhadow at the ſummer ſolſtice to be to the height of the gnomon as 213½ to 600 ; the ſame which Gaſſendus afterwards found it in the year 1636.

The elevation of the pole may be found by means of the gnomon, by finding the meridian height of the ſun ; for this being given, we have the elevation of the equator, and conſequently that of the pole. The meridian height of the ſun may be found in the following manner. (Plate CCIX.) Let AC, fig. 1. be the gnomon, AB the ſhadow, and CB part of a ray drawn from the centre of the ſun paſſing by the top of the gnomon and terminating the ſhadow at B. Theſe three lines form a right-angled triangle BAC, whereof the two legs AB and AC are given, the number of feet and inches in them being found by actual menſuration. Hence the acute angles may be found in the following manner. Let one leg be radius, and the other will be tangent of the oppoſite angle. Thus, if we make AB radius, AC will be tangent of the oppoſite angle ABC. This tangent is found by the golden rule, as the number of feet, inches, &c. in AB, is to the number of feet, inches, &c. in AC ; ſo is the radius to a fourth number, which is the tangent required. This fourth number looked for in the table of tangents gives the meaſure of the angle ABC, which is the meridian height of the ſun required.

50
Inaccuracies of this method.

This method of obſervation, however, is by no means accurate ; and Ricciolus takes notice of the following deficiencies in the ancient obſervations made in this manner : 1. They did not take into account the ſun's parallax, which makes his apparent altitude ten ſeconds leſs than it would be if the gnomon were placed at the centre of the earth. 2. They neglected refraction, by which the apparent height of the ſun is ſomewhat increaſed. 3. They made their calculations as if the ſhadow were terminated by a ray coming from the ſun's centre; whereas it is bounded by one coming from the upper edge of his limb. In many caſes, however, theſe errors are of no moment; but at any rate they may be corrected in the following manner: To the altitude of the ſun found by the gnomon, add his parallax of 10″, and take from the ſum the ſemidiameter of the ſun at that time, which is about 16′; together with the refraction, which is different at different heights of the ſun, and muſt be had from a table of refractions. Thus the altitude of the ſun will be had free of any errors, excepting thoſe unavoidable ones ariſing from the difficulty in finding the true length of the ſhadow by reaſon of the penumbra, which always accompanies it.

51 Gnomons which do not ſhow the altitude by the ſhadow.

Some gnomons ſhow the altitude of the ſun not by the ſhadow, but by an hole in the top made in a plate of metal inſerted there, through which the rays fall upon a level pavement. In gnomons of this kind the centre of the inſtrument is always exactly under the hole in the metal-plate; and the method of finding the height of the ſun is the ſame as that already deſcribed. A gnomon of this kind was made in the year 1576 by Egnatio Dante in the church of St Petronia at Bologna. Near the top of the ſouth wall of the church he placed a braſs plate about three-eighths of an inch thick, in which was cut a circular hole almoſt exactly an inch in diameter. The plate was ſet in the wall at an angle of about 45½ deg. the height of the equator in that place. The height of the hole in the plate from the ground is near 66 feet, and the length of the line drawn upon the pavement is 169 feet. This line, however, is not exactly in the meridian, but as near it as the pillars of the church would admit: and on it the rays of the ſun, paſſing through the hole, formed an ellipſis at different diſtances from the wall, according to the ſeaſon of the year. Another gnomon of this kind was made in the ſame church by Dominico Caſſini in 1645. He placed the braſs-plate through which the rays of the ſun were to paſs in the roof of the church, and drew a meridian line 120 feet long upon the pavement; which performance was ſo much approved, that a medal was ſtruck upon the occaſion. In like manner Bianchini and Moraldi drew a meridian line upon the pavement of the great hall of the baths of Diocleſian, now the church of the Carthuſians at Rome.

52 Conſtruction of theſe gnomons.

To conſtruct gnomons of this kind, place the braſs-plate with the hole in it in the ſouth end of the roof of the building; by a thread with a plummet at the end of it let down through the centre of the hole, find the point in the pavement which is exactly under it; this point is the centre of the gnomon: from this centre draw ſeveral concentric circles: an hour or two before and after noon mark the points where the northern as alſo where the ſouthern edge of the ſun's picture touches theſe circles, and there will be ſeveral arches, through the middle of which a line drawn from the centre of the gnomon is a meridian line, as will be underſtood from what has been already ſaid concerning the method of drawing theſe lines. The meridians juſt mentioned are uſually marked upon long plates of braſs, with which the marble pavement is laid; there are alſo drawn upon it lines croſſing the meridians at right angles, to ſhow how far the centre of the ſun's image reaches at different times of the year: when this at noon is fartheſt from the centre of the gnomon, the ſun is then loweſt, and it is the winter ſolſtice: when the ſame picture is neareſt to the centre of the gnomon, the ſun is higheſt, and conſequently he is then in his greateſt north declination, and it is then the ſummer ſolſtice.

53 To find the time of the ſolſtice.

The time of the ſolſtice is obſerved, by marking exactly the diſtance of the ſun's picture from the centre of the gnomon the day before and the day after the ſolſtitical day: if theſe diſtances be exactly equal, the meridian heights of the ſun are for theſe two days exactly equal; and then the time of the ſun's being in the ſolſtitical point is exactly at noon: if the diſtance of the ſun's picture from the centre of the gnomon be greater the day before the ſolſtice than it is the day after, it ſhows that the time of the ſolſtice is before noon; and if leſs, that it is after noon. It is, however, extremely difficult to determine the exact moment of the ſolſtice by this method, or even to approach within ſome hours of it; for at thoſe times the ſun's declination, and conſequently his meridian height, alters not above 15″ in a natural day; and therefore an error of more than 15″ in the obſervation of the ſun's meridian height will occaſion an error of a whole day in fixing the time of the ſolſtice, an error of one half of 15″ will occaſion an error of half a day; and ſo in proportion.

54 Of the equinox.

The time of the equinox is found by a gnomon in the following manner: On the day of the equinox find the meridian height of the ſun and the height of the equator. If theſe be equal, the equinox is exactly at noon; if the height of the ſun be different from that of the equator, then as many minutes as the ſun is higher than the equator, ſo many hours is the moment of the equinox before noon; as many minutes as the ſun is lower than the equator, ſo many hours is the equinox after noon. The reaſon of this computation is, that at the equinox the declination of the ſun alters at the rate of 34 minutes in a natural day, which is at the rate of a minute in an hour; whence it appears that the equinoxes are much more eaſily obſerved than the ſolſtices. It is probable that many of the obeliſks in Egypt were erected for the purpoſe of obſerving the altitude of the ſun by the length of the ſhadow. It is likewiſe worth obſerving, that the Spaniards at the conqueſt of Peru found pillars of curious and coſtly workmanſhip, by the meridian ſhadows of which their *Amautas* or philoſophers had by long experience and obſervation learned to determine the time of the equinoxes: theſe ſeaſons of the year were celebrated by them with great feſtivity and rejoicing in honour of the ſun, whom they imagined to ſit at thoſe times in all his glory upon the throne they had erected for him; and therefore on thoſe days they preſented him with rich offerings of gold, ſilver, jewels, and other valuable gifts; adorning his throne, as they did alſo the pillars, with fragrant herbs and flowers.

55 Geographical uſes of the obſervations of the heavenly bodies.

The principal uſes which geographers have for obſerving the altitudes of the celeſtial bodies with ſuch accuracy, are to determine the length of the year, the ſeaſons, but eſpecially the diſtance of places on the earth, their ſituation with regard to one another, and the dimenſions of the whole. An account of the moſt remarkable attempts for diſcovering the circumference of the globe has been given in the preceding ſection. The foundation of the whole is to obtain an exact meaſure of one degree of meridian; which being once got, we have only to multiply the number of miles, feet, or any other meaſure employed, by 360, the number of degrees in the circumference, and the product is that of the whole globe. This being obtained, we may eaſily determine its ſuperficial and ſolid contents by the geometrical methods employed in other caſes. According to the beſt calculations which have yet appeared, the dimenſions of this globe are as follow.

	English miles.
One minute of a degree contains	$1\frac{9}{61}$
A degree - - -	$69\frac{1}{2}$
The circumference - -	24,930
The diameter - - -	$7935\frac{4}{5}$
The ſemidiameter - -	$3967\frac{1}{2}$
The ſuperficial meaſure	200,000,000

The ſolid contents two hundred and ſixty-ſix thouſand millions of cubic miles.

A ſecond of a degree is no more than $101\frac{1}{2}$ Engliſh feet.

56
Difference between the apparent and true levels.

Plate CCXI.

In making meaſurements of this kind, the principal difficulty ariſes from the want of an abſolutely level ſurface, the length of which may be determined by actual menſuration as the foundation of our calculations. Snellius, as has already been mentioned, had a ſingular opportunity of this kind by means of a great extent of ice; and ſimilar conveniences might be had on the frozen lakes in the north of Europe, though difficulties would there ariſe from the great refraction of the atmoſphere. It muſt likewiſe be conſidered, that there is always ſome difference between the apparent level and the true, which in great diſtances is apt to affect our calculations materially. A truly level ſurface is the ſegment of any ſpherical ſurface concentric to the ſurface of the earth: thus the ſurface of the ſea or any large piece of water when at reſt forms itſelf into a true level. A true line of level then is an arch of a great circle, which we ſuppoſe to be deſcribed upon a truly level ſurface. The apparent level is a ſtraight line drawn tangent to the true level; whence every point of the apparent level, excepting only that of contact, is ſomewhat higher than the true level. This difference is eaſily known after the ſemidiameter of the earth is known. Thus in fig. 6. let the obſerver ſtanding at A look through a teleſcope placed horizontally at the object B; here BAC is a right-angled triangle, in which if AC be be made radius, AB will be tangent, and CB ſecant of the angle ACB. Now, to find this tangent, ſay, as the number of feet in AC is to the number of feet in AB, the diſtance of the object; ſo is AC as radius to AB as tangent. Then having found the tangent AB in the table, we have the ſecant CB; from which if the radius CG be taken, the remainder GB is the exceſs of the ſecant above the radius, or the height of the apparent level above the true. The following table was conſtructed by Caſſini.

A Table ſhowing the Height of the Apparent Level above the True.

If the diſtance of the object from the place of the ſpectator be Seconds.	which meaſured in a great circle upon the earth amounts to Feet.	Inch.	the height of the apparent level above the true will be Inch.
1	101	6.8	
2	203	1.6	
3	304	8.4	
4	406	3.2	
5	507	10.0	0.074
6	609	4.8	
7	710	11.6	
8	812	6.4	
9	914	1.2	
10	1015	8.0	0.296
11	1117	2.8	
12	1218	9.6	
13	1320	4.4	
14	1421	11.2	
15	1523	6.0	
16	1625	0.8	
17	1726	7.6	
18	1828	2.4	
19	1929	9.2	
20	2031	4.0	1.186
21	2132	10.8	
22	2234	5.6	
23	2336	0.4	
24	2437	7.2	
25	2539	2.0	
26	2640	8.8	
27	2742	3.6	
28	2843	10.4	
29	2945	5.2	
30	3047	0.0	2.670
31	3148	6.8	
32	3250	1.6	
33	3351	8.4	
34	3453	3.2	
35	3554	10.0	
36	3656	4.8	
37	3757	11.6	
38	3859	6.4	
39	3961	1.2	
40	4062	8.0	4.746
41	4164	2.8	
42	4265	9.6	
43	4367	4.4	
44	4468	11.2	
45	4570	6.0	
46	4672	0.8	
47	4773	7.6	
48	4875	2.4	
49	4976	9.2	
50	5078	4.0	7.409
51	5179	10.8	
52	5281	5.6	
53	5383	0.4	
54	5484	7.2	
55	5586	2.0	
56	5687	8.8	
57	5789	3.6	
58	5890	10.4	
59	5992	5.2	
60	6094	0.0	10.680

The Continuation of the Foregoing Table.

If the diſtance of the object from the place of the ſpectator be which meaſured in a great circle upon the earth amounts to the height of the apparent level above the true will be

Min.	Feet.	Feet.	Inch.
1	6094	0	10.680
2	12188	3	6.580
3	18282	7	11.853
4	24376	14	1.812
5	30470	22	1.932
6	36564	31	11.412
7	42658	42	5.436
8	48752	56	9.384
9	54846	71	9.876
10	60940	88	7.728
11	67034	107	2.940
12	73128	127	7.512
13	79222	149	9.444
14	85316	173	8.736
15	91410	199	4.320
16	97504	226	9.264
17	103598	255	11.568
18	109692	286	11.232
19	115786	319	7.188
20	121880	354	0.504
21	127974	390	4.248
22	134068	428	5.352
23	140162	468	10.224
24	146256	510	6.084
25	152350	553	11.232
26	158444	599	1.776
27	164538	646	1.680
28	170632	694	10.944
29	176726	745	5.568
30	182820	797	8.484
31	188914	851	9.828
32	195008	907	8.532
33	201102	965	3.528
34	207196	1024	7.884
35	213290	1085	9.600
36	219384	1148	8.676
37	225478	1213	5.112
38	231572	1277	10.908
39	237666	1348	2,064
40	243760	1417	1.764
41	249854	1496	11.388
42	255948	1569	10.452
43	262042	1638	9.084
44	268136	1716	0.108
45	274230	1794	11.424
46	280324	1875	7.032
47	286418	1958	0.000
48	292512	2042	2.328
49	298606	2128	2.016
50	304700	2215	6.792
51	310794	2305	5.472
52	316888	2396	9.240
53	322982	2489	10.368
54	329076	2584	8.856
55	335170	2681	4.704
56	341264	2779	9.912
57	347358	2880	0.480
58	353452	2982	0.408
59	359546	3085	8.628
60	365640	3191	2.208

The Uſes of this table are, 1. An arc of a great circle on the earth being given in ſeconds or minutes, to find the length of it in miles or feet. Thus an arc of 8 ſeconds is 812 feet ſix inches and four-tenths of an inch; and thus again an arc of 20′ is 121880 Engliſh feet. 2. An arc of a great circle upon the earth being given in ſeconds or minutes, or in feet or inches, to find the height of the apparent level above the true. In very ſmall arcs this is ſo little, that it may be diſregarded, and is therefore marked only at 5″, and afterwards at every 10″ in the table of ſeconds, and at every ſingle minute in the other. 3. The diſtance of any object which is viewed through ſights placed horizontally being given, the height of it may be found; or converſely, the height of any object being given, the diſtance of it may be found. Thus, if the diſtance of an object whoſe top is in the horizon be 15′ or 91410 feet, the height of that object is 199 feet 4 inches; and thus converſely, if the height of an object whoſe top is in the horizon be 199 feet 4 inches, the diſtance will be 91,410 feet. 4. If the diſtance of an object given be a number of feet which is not in the table, take that which is next to it, and ſay, as the ſquare of the number thus taken is to the ſquare of the number given; ſo is the height of the apparent level above the true, correſponding to the number taken, to the height of the apparent level which correſponds to the number given. Thus, if it be inquired what is the height of the apparent level above the true when the diſtance of the object is 200,000 feet, the neareſt number to this in the table is 201,102, the height of the level correſponding thereto is 965 feet; ſay then, as the ſquare of 201,102 is to the ſquare of 200,000; ſo is 965 to a fourth number by which the apparent level exceeds the height of the true one, at the diſtance of 200,000 feet.

Hitherto we ſuppoſed the line of level to be a tangent to an arc of a great circle drawn upon the ſurface of the earth; whereas in levelling, the eye is uſually at ſome diſtance above the ſurface, ſuppoſe 4 feet; but this makes no difference in levelling; for as the height of the eye muſt be added to the ſecant CB, fig. 6. becauſe ML is ſuppoſed in levelling to be parallel to HD, there is indeed a difference between the length of AI and BL, but it is quite inſenſible. Another uſe of the table is for levelling, in order to convey water from one place to another. See LEVELLING. We ſhall now proceed to give a ſolution of ſome geographical problems relating to the horizon.

57 Of finding the extent of the horizon.

1. To find the extent of the viſible horizon, the ſemidiameter of the earth and height of the eye being given. Let ADE, fig. 3. be an arc of a great circle upon the earth, C the centre of the earth, B the eye of the obſerver, BD the height of the eye, BA and BE lines drawn from the eye touching the ſurface of the earth at A and E, and terminating the viſible horizon; the length of BA is required. In order to find it, add DB the height of the eye, which ſuppoſe to be 5 feet, to DC the ſemidiameter of the earth, which is 20,949,655 feet; and you have the length of CB 20,949,660 feet; draw CA, and you have a triangle BAC whoſe angle at A is a right one; make the hypothenuſe CB radius, and CA will be the ſine of the oppoſite angle ABC. Say then, as CB is to CA; ſo is the whole ſine or radius to the ſine of the angle

ABC. This angle being found, its complement ACB is known, and conſequently alſo the arc AD, which may be found in feet or miles by the table: Thus, in the foregoing example, as 20,949,660 is to 20,949,655; ſo is the radius 1000, &c. to a fourth number, viz. 9,999,993, which number is the ſine of an angle of 89° 56′; the angle ABC then is 89° 56′; and therefore its complement ACD is 4′, and the arc DA is 4′; that is, by the table, 24376 feet.

58 Depreſſion of the horizon of the ſea.

2. To find the depreſſion of the viſible horizon of the ſea at a given height of the eye. In fig. 3. if the eye be at B, the ſenſible horizon is FG, the depreſſion of the horizon of the ſea is the angle FBA; which, being the complement of ABC, is equal to ACD, that is, 4′.

59 Extent of the horizon at any height of the eye.

3. To find the extent of the viſible horizon at any height of the eye by obſervation. The ſemidiameter of the horizon does not ſenſibly differ from an arch of a great circle upon the earth of the ſame number of minutes and ſeconds as the angle of depreſſion is obſerved to be; and the number of feet contained in that arc may be found in the table: Thus, if the depreſſion of the horizon be 30′; its ſemidiameter is alſo 30′; that is, by the table 182,820 feet. Various accounts of the extent of the viſible horizon are given by different authors: either becauſe they differ in their accounts of the earth's ſemidiameter from whence that of the horizon is computed, or in the meaſures they make uſe of.

The following table, taken from Caſſini, ſhows the different depreſſions of the horizon of the ſea at different heights of the eye, both by obſervation and calculation; with the difference betwixt the two occaſioned by refraction.

The height of the eye above the ſurface of the ſea.		The depreſſion of the horizon of the ſea.		
Feet	Inches	′	″	
1157	6,9	32	30	by obſervation
		36	18	by calculation
Difference by refraction		3	48	
775	2,3	27	0	by obſervation
		29	36	by calculation
Difference by refraction		2	36	
571	11,0	24	0	by obſervation
		25	25	by calculation
Difference by refractiou		1	25	
387	3,4	19	45	by obſervation
		20	54	by calculation
Difference by refraction		1	9	
288	4,3	15	0	by obſervation
		17	1	by calculation
Difference by refraction		2	1	
187	0,9	13	0	by obſervation
		14	41	by calculation
Difference by refraction		1	41	
9	7,3	3	20	by obſervation
		3	18	by calculation

Here the calculated depreſſion is greater than that by obſervation in all the caſes except the laſt, which is leſs by two ſeconds; but the inſtrument uſed by our author would not diſcover ſuch a ſmall difference. Refraction by raiſing the objects of viſion makes the angle of depreſſion leſs; but refraction itſelf is variable, and of conſequence the depreſſion and extent of the horizon alſo. Caſſini informs us, that, even in the fineſt weather, refraction was different at the ſame hours of different days, and at different hours of the ſame day. The truth of this poſition is eaſily ſeen by fixing a teleſcope with croſs hairs, ſo that the weather-cock of a diſtant ſteeple may be viewed through it: for at different times of the day the weather-cock will ſometimes appear in the centre of the object-glaſs, ſometimes above and ſometimes below it: the ſame experiment may alſo be tried with plain ſights. It has long been obſerved, that the top of a diſtant hill may at ſome times, when the refraction is greateſt, be ſeen from a ſtation from which at other times, when refraction is leſs, it cannot be ſeen, even when the weather is ſufficiently clear.

60 Earth not an exact ſphere.

Hitherto we have ſuppoſed the circumference of the earth to be exactly circular, or the globe itſelf to be a perfect ſphere; but, from ſome obſervations, this appears not to be the caſe. Some time ago, the French made an obſervation, ſhowing that a pendulum vibrates ſlower in proportion as it is brought nearer to the equator: that is, the gravity or clerity of deſcent of the pendulum, and of all other bodies, is leſs in countries approaching to the equator than in places near either pole. This excited the curioſity of the celebrated philoſophers Huygens and Newton, who thence conjectured that the earth muſt have ſome other figure than what was commonly ſuppoſed. Sir Iſaac Newton afterwards demonſtrated that this diminution of weight naturally ariſes from the earth's rotation round its axis; which, according to the laws of circular motion, repels all heavy bodies from the axis of motion: ſo that this motion, being ſwifter at the equator than in parts more remote, the weight of bodies muſt alſo be much leſs there than nearer the poles.—To determine this matter, ſeveral mathematicians were by the French king employed to meaſure a degree on the earth's ſurface in different parts of the world; and, according to their menſurations, the diameter of the earth from north to ſouth is ſhorter than that from eaſt to weſt by 36 miles.

61 Of finding the longitudes and latitudes.

With regard to the method of finding the longitudes and latitudes of particular places, rules have been already laid down under Astronomy, n° 408, and 482, 483. The ſame thing, however, may be done by other methods. Thus the latitude may be found by obſerving exactly the meridian altitude of the ſun, and knowing his declination for that day, the declination ſubtracted from the meridian altitude gives the complement of the latitude, and this laſt ſubtracted from 90° leaves the latitude required. As to the longitude Mr Harriſon, by his invention of time-pieces which go much more exactly than either clocks or watches could be made to do formerly, hath in a great meaſure facilitated that. For ſuppoſing any perſon, poſſeſſed of one of theſe time-pieces, to ſet out on a journey, *e. g.* from London. If he adjuſts his time-piece properly before he goes away, he will know the hour at London exactly, let him go where he pleaſes ; and when he hath proceeded ſo far either eaſtward or weſtward, that a difference is perceived betwixt the hours ſhown by his time-piece, and thoſe on the clocks or watches at the place to which he goes, the diſtance of that place from London in degrees and minutes of longitude will be known ; and if the length of a degree of longitude is known, the real diſtance between the two places may alſo be eaſily found. It is not to be expected, however, that any inſtrument, with whatever care it may be conſtructed, can always be depended upon as an exact meaſurer of time ; and therefore, frequent corrections of longitudes taken in this manner will be neceſſary. The method of finding the longitude from the eclipſes of Jupiter's ſatellites appears to be the beſt of any. Eclipſes of the ſun, and occultations of the ſtars by the moon, are alſo very proper, though they happen but ſeldom. Eclipſes of the moon have alſo been made uſe of for this purpoſe ; but it is found impoſſible to obſerve either the beginning or end of a lunar eclipſe with the accuracy neceſſary for determining the longitude of any place.—All theſe different methods agree in this, that they determine the longitude by the difference of time between the obſervation of the phenomenon in two different places ; and of this time, four minutes are to be allowed for every degree of longitude either eaſt or weſt.

62
Of the different kinds of maps.

After the geographer is thus become acquainted with the longitudes and latitudes of a great number of different places, he may delineate them upon paper, or make a *map*, either of the whole world, or of any particular country with which he is beſt acquainted. General maps of the world, or of very large tracts, anſwer the purpoſe of ſhowing in what manner the different countries of the world lie with reſpect to each other. They cannot be made of ſuch a ſize as to admit the delineation of many particular towns or cities, neither indeed is it at all required. Where the whole world is delineated at once, the mind can hardly take in more than the idea of the ſituations of different kingdoms from one another ; the ſituations of the different cities of each particular kingdom being almoſt wholly overlooked, and not attended to : and this happens likewiſe where a very large portion of the globe, as one of the four quarters, is repreſented on a ſingle map. Beſides theſe, therefore, it is neceſſary to have particular maps of all the different countries done upon a larger ſcale, that thus the mind may not be fatigued by endeavouring to comprehend too much at once. The qualifications which maps ought to have, in order to render them complete, are, 1. That they repreſent the countries exactly of the ſame ſhape, and in the ſame proportions to the eye, that they really have on the earth itſelf. 2. That the diviſions of one country from another be diſtinctly marked, and readily perceptible, without a diſagreeable and tedious ſearch. 3. That the longitudes and latitudes of different places be found exactly on the map, and with little or no trouble.

The foundation of all maps is what is called *the projection of the ſphere*, i. e. the delineation of thoſe circles apparently traced out by the ſun in the heavens, upon ſome ſubſtance, either plane or ſpherical, deſigned to repreſent the ſurface of the earth ; upon which alſo are delineated the parallels of latitude, and the meridians, in as great number as the ſize of the map will admit of without confuſion.

Theſe delineations upon a ſpherical ſurface are very eaſy : and under the article GLOBE, full directions are given for the conſtruction of the ſpherical ſubſtances upon which maps of the earth and the heavens are uſually delineated ; and which, when furniſhed with the reſt of their apparatus, are called *terreſtrial* and *celeſtial globes*. The method of drawing the maps for theſe globes is never followed in any other caſe ; for which reaſon it is alſo referred to the article GLOBE. The ordinary kinds of maps are conſtructed by delineating the circles of the ſphere upon a plane ſurface, according to the rules of perſpective. This is properly the projection of the ſphere ; and is deſigned to give a view of the terraqueous globe, as it would appear, at ſome diſtance, to an eye that could take in the whole extent of it at once.

§ 1. *Of Projections of the Spheres and Maps.*

OF projections there are two kinds, the *orthographic* and *ſtereographic* ; both of which repreſent the ſurface of the earth projected upon the plane of one of its great circles.

63
Orthographic projection.

I. The *orthographic* ſuppoſes the eye to be placed at an infinite diſtance in the axis of the circle of projection, while the ſtereographic ſuppoſes it to be only in the pole of that circle. The circles on which the projections are uſually made, are, the equator, ſome of the meridians, or the rational horizon of ſome particular place. For maps of the world a meridian is generally choſen ; and moſt commonly that one which paſſes through Ferro, one of the Canary iſlands, becauſe thus the continents of Europe, Aſia and Africa are conveniently delineated in one circle, and America in the other.

64
On the plane of a meridian.

1. To project the ſphere orthographically on the plane of any meridian, we have only to conſider, that as the eye is ſuppoſed to be at an infinite diſtance, all the rays which come from the diſk of the earth are parallel ; and conſequently all lines drawn from the eye to the diſk muſt be perpendicular to the latter. Let therefore, A B C D, (fig. 1.) repreſent the plane of one of the meridians. The equator, which cuts all the meridians in the middle, muſt be repreſented by an infinite number of points let fall upon the plane of projection, and dividing it exactly in the middle ; that is, by the right line BD. The parallels of latitude being alſo perpendicular to the plane of the meridian, will be marked out by an infinite number of right lines let fall from their peripheries upon that plane, thus forming the right lines *a b*, *c d*, &c. The meridians will likewiſe be repreſented on the diſk by an infinite number of right lines let fall perpendicularly from their peripheries upon the plane of projection, and thus will form the elliptic curves A 10 C A 20 C, &c. From an inſpection of the figure, therefore, it appears, that in this projection both longitudes and latitudes are meaſured by a line of ſines, and both of them decreaſe prodigiouſly as we approach the edges of the diſk ; and hence the countries which lie at a diſtance from the equator are exceedingly diſtorted, and it is even impoſſible to draw them with any degree of accuracy. The orthographic projection on the plane of a meridian, therefore, is never uſed but for a map of the world.

Plate CCIX.

2. On

65 On the equator. fig. 2.

2. On the plane of the equator, the orthographic projection repreſents the meridians as ſtraight lines diverging from a centre, and the parallels of latitude as concentric circles. The latter, however, are by no means to be placed at equal diſtances from each other; for the meridians are to be divided by the line of ſines, as in the laſt; and thus the equatorial parts of the globe are as much diſtorted and confuſed as the polar ones were in the foregoing. This projection, therefore, is ſeldom uſed for a map of the whole world, though it anſwers very well for a repreſentation of the polar regions.

66 On any particular horizon, fig. 3.

3. On the horizon of any particular place, except either of the poles, or any point lying directly under the equator, the orthographic projection repreſents both parallels and meridians by ſegments of ellipſes. The figure ſhows a map done on the horizon of Ur of the Chaldees: it is obvious, however, that a conſiderable degree of diſtortion takes place here alſo; though leſs than in the former caſes. Projections of this kind, therefore, are uſed only for the conſtruction of ſolar eclipſes. See ASTRONOMY, ſect. x.

67 Stereographic projection.

II. The *ſtereographic* projection of the ſphere ſuppoſes the eye to be in the pole of the circle of projection. The laws of this projection are,

1. A right circle is projected into a line of half tangents.

2. The repreſentation of a right circle, perpendicularly oppoſed to the eye, will be a circle in the plane of the projection.

3. The repreſentation of a circle placed oblique to the eye, will be a circle in the plane of the projection.

4. If a great circle is to be projected upon the plane of another great circle, its centre will lie in the line of meaſures, diſtant from the centre of the primitive by the tangent of its elevation above the plane of the primitive.

5. If a leſſer circle, whoſe poles lie in the plane of the projection, were to be projected; the centre of its repreſentation would be in the line of meaſures, diſtant from the centre of the primitive, by the ſecant of the leſſer circles diſtance from its pole, and its ſemidiameter or radius be equal to the tangent of that diſtance.

6. If a leſſer circle were to be projected, whoſe poles lie not in the plane of the projection, its diameter in the projection, if it falls on each ſide of the pole of the primitive, will be equal to the ſum of the half tangents of its greateſt and neareſt diſtance from the pole of the primitive, ſet each way from the centre of the primitive in the line of meaſures.

7. If the leſſer circle to be projected fall entirely on one ſide of the pole of the projection, and do not encompaſs it: then will its diameter be equal to the difference of the half tangents of its greateſt and neareſt diſtance from the pole of the primitive, ſet off from the centre of the primitive one; and the ſame way in the line of meaſures.

8. In the ſtereographic projection, the angles made by the circles of the ſurface of the ſphere, are equal to the angles made by their repreſentatives in the plane of their projection.

For a demonſtration of theſe laws, ſee the articles PERSPECTIVE and PROJECTION. The method of delineating general maps of the world will, however, be eaſily underſtood by the following directions.

68 On the plane of a meridian, fig. 6.

1. To delineate a map of the earth upon the plane of a meridian. Draw a circle of any convenient magnitude, as ABCD, to repreſent one half of the earth's diſc; draw two diameters AB, CD, interſecting each other at right angles; AB will then repreſent the equator. and CD that meridian which is directly perpendicular to the plane of projection, C will be the north pole, and D the ſouth pole. Divide the circle into 360 equal parts, repreſenting the degrees of latitude; or into ſmaller parts, if it can admit of ſuch a diviſion, to repreſent minutes. Then, by means of a ſector, divide the equator AB into two lines of ſemitangents EA and EB, which will repreſent the degrees of longitude. Then with the ſecant of 80°, as a radius deſcribe the arch of the circle C*c*D, which repreſents a meridian cutting the plane of projection, at an angle of 80°; with the ſecant of 70°, deſcribe the arch C*d*D, which repreſents a meridian cutting the plane of projection at 70°; and thus proceed with the reſt of the meridians, which are uſually drawn at every 10 degrees longitude, as the parallels are at every 10 degrees latitude. Theſe laſt are to be drawn with the tangents for radii as the meridians are with the ſecants; GH repreſenting the parallel of 10 degrees, with the tangent of 80°, that of 20 with the tangent of 70, &c. The ecliptic AQB is drawn with the tangent of 66.31 for a radius, its greateſt diſtance from the equator being 23.29. This is the moſt common projection for maps of the world, and is that on which the map Plate CCXIV. is delineated. It hath this diſadvantage, however, that neither the degrees of longitude nor latitude continue of the ſame length, even under the ſame parallel; and conſequently the ſhape of the countries is ſomewhat diſtorted: it is alſo exceedingly difficult to find the preciſe degree of longitude or latitude belonging to any place upon maps of this kind, as muſt be evident from an inſpection of the figures.

69 On a particular horizon.

2. On the plane of the horizon. Suppoſe, for inſtance, it is deſired to have London the centre of the map: its latitude we will ſuppoſe to be 51 degrees 32 minutes. Take then the point E (fig. 5.) for London; and from this, as a centre, deſcribe the circle ABCD to repreſent the horizon; which you are then to divide into four quadrants, and each of theſe into 90 degrees. Let the diameter BD be the meridian, B the northern quarter, D the ſouthern; the line of equinoctial eaſt and weſt ſhows the firſt vertical, A the weſt, C the eaſt, or a place of 90 degrees from the zenith in the firſt vertical. All the verticals are repreſented by right lines drawn from the centre E to the ſeveral degrees of the horizon. Divide BD into 180 degrees, as in the former method; the point in EB repreſenting 51 deg. 32 min. of the arch BC, will be the projection of the north pole, which note with the letter P. The point in ED repreſenting 51 deg. 32 min. of the arch DC (reckoning from C towards D), will be the projection of the interſection of the equator and meridian of London; and from this, towards P, write the numbers of the degrees, 1, 2, 3, &c. As alſo towards D, and from B towards P, viz. 51, 52, 53, &c. Then taking the correſponding points of equal degrees, 88, 89, &c. about thoſe, as diameters, deſcribe circles, which will repreſent parallels or circles of latitude,

titude, with the equator, tropics, and polar circles. For the meridians, firſt deſcribe a circle through the three points A, P, C. This will repreſent the meridian 90 degrees from London. Let its centre be M in BD (continued to the point N, which repreſents the ſouth pole), PN being the diameter: through M draw a parallel to AC, *viz.* FH, continued each way to K and L. Divide the circle PHNF into 360 degrees, and from the point P draw right lines to the ſeveral degrees cutting KFHL: through the ſeveral points of interſection, and the poles P, N, as through three given points, deſcribe circles repreſenting all the meridians. The centres for deſcribing the arches will be in the ſame KL, as being the ſame that are found by the former interſection; but are to be taken with this caution, that for the meridian next BDN towards A, the moſt remote centre towards L be taken for the firſt, the ſecond from this, &c.—The circles of longitude and latitude thus drawn, inſert the places from a table.

Maps of this kind may be uſeful for particular purpoſes: but the irregular length of the degrees, both of longitude and latitude, render them very unfit for repreſenting the countries in their proper ſhape; and the difficulties in finding the particular degrees of longitude and latitude are even greater in this than any other projection, as is evident from the inſpection of fig. 4.

III. Beſides theſe, there may be a variety of other projections, though few of them are applicable to any particular purpoſe. The three following are thoſe moſt generally uſeful, as having each ſome peculiar property which cannot be found in any other but themſelves.

70 Projection in which the earth is ſuppoſed to be conica

1. If, inſtead of its globular figure, we ſuppoſe the earth to have a conical one, it is plain, that the meridians would be repreſented by ſtraight lines diverging from the apex of the cone, while the parallels are ſhown by concentric circles placed at equal diſtances. This kind of projection is ſhown in Plate CCXIII. fig. 1, 2. It hath this great advantage, that the longitudes and latitudes may be found with the greateſt eaſe by means of a moveable index placed on the centre. The whole earth may alſo be thus repreſented on a ſingle circle: but thus the countries towards the ſouth pole are prodigiouſly augmented in breadth in proportion to their length; for the degrees of longitude conſtantly increaſe the farther we are removed from the pole, while thoſe of latitude ſtill remain the ſame. This apparent error, however, doth not in the leaſt affect the real proportion of the map, or render it more difficult to find the longitudes or latitudes upon it.

71 Mercator's projection, ſuppoſing it a cylinder.

2. Mercator's projection ſuppoſes the earth, inſtead of a globular, to have a cylindrical figure; in conſequence of which, the degrees of longitude become of an equal length throughout the whole ſurface, and are marked out on the map by parallel lines. The circles of latitude alſo are repreſented by lines croſſing the former at right angles, but at unequal diſtances. The farther we remove from the equator, the longer the degrees of latitude become in proportion to thoſe of longitude, and that in no leſs a degree than as the ſecant of an arch to the radius of the circle: that is, if we make one degree of longitude at the equator the radius of a circle; at one degree diſtant from the equator, a degree of latitude will be expreſſed by the ſecant of one degree; at ten degrees diſtance, by the ſecant of ten degrees; and ſo on.* A map of the world, therefore, cannot be delineated upon this projection, without diſtorting the ſhape of the countries in an extraordinary manner. The projection itſelf is, however, very uſeful in navigation, as it ſhows the different bearings with perfect accuracy, which cannot be done upon any other map. See CCXIII. fig. 3.

72 Globular projection.

3. The globular projection is an invention of M. de la Hire, and is more uſeful than any of the former for exhibiting the true ſhape of the countries. It may be made in the following manner: Having drawn a circle repreſenting one-half of the earth's diſc, draw two diameters as before, which repreſent the equator and vertical meridian. Divide each of theſe into 180 equal parts for the meaſures of the degrees of longitude and latitude. Then through the two poles, and every tenth diviſion on the equator, draw arches of circles for the meridians; and in like manner through every tenth degree on each ſemicircle draw an arch, which ſhall likewiſe paſs through every tenth diviſion on the meridian for the parallels of latitude.

73 Conſtruction of particular maps.

IV. The conſtruction of maps of particular parts of the earth requires a different operation. Large portions of its ſurface may indeed be drawn on the plane of the meridian, as before directed; but when a ſmall part, as the iſland of Britain, for inſtance, is to be repreſented on a large ſcale, it would be found difficult to draw the arches of ſuch large circles as are neceſſary, and therefore the following method may be adopted. In this caſe, the degrees of longitude and latitude may be both repreſented by ſtraight lines. It is to be remembered, however, that though the degrees of latitude always continue of an equal length, it is not ſo with thoſe of longitude. They muſt neceſſarily decreaſe as we approach the pole. The proportion in which they decreaſe may be found by the line of longitudes on the plane ſcale; or by the following

* See Plate CCXII.

TABLE, ſhowing the Number of Miles contained in a Degree of Longitude, in each Parallel of Latitude from the Equator.

Degree of Latitude.	Miles.	100th parts of a mile.	Degrees of Latitude.	Miles.	100th parts of a mile.	Degrees of Latitude.	Miles.	100th parts of a mile.
1	59	96	31	51	43	61	29	04
2	59	94	32	50	88	62	28	17
3	59	92	33	50	32	63	27	24
4	59	86	34	49	74	64	26	30
5	59	77	35	49	15	65	25	36
6	59	67	36	48	54	66	24	41
7	59	56	37	47	92	67	23	45
8	59	40	38	47	28	68	22	48
9	59	20	39	46	62	69	21	51
10	59	08	40	46	00	70	20	52
11	58	89	41	45	28	71	19	54
12	58	68	42	44	95	72	18	55
13	58	46	43	43	88	73	17	54
14	58	22	44	43	16	74	16	53
15	58	00	45	42	43	75	15	52
16	57	60	46	41	68	76	14	51
17	57	30	47	41	00	77	13	50
18	57	04	48	40	15	78	12	48
19	56	73	49	39	36	79	11	45
20	56	38	50	38	57	80	10	42
21	56	00	51	37	73	81	09	38
22	55	63	52	37	00	82	08	35
23	55	23	53	36	18	83	07	32
24	54	81	54	35	26	84	06	28
25	54	38	55	34	41	85	05	23
26	54	00	56	33	55	86	04	18
27	53	44	57	32	67	87	03	14
28	53	00	58	31	70	88	02	09
29	52	48	59	30	90	89	01	05
30	51	96	60	30	00	90	00	00

Suppoſe, then, it is required to draw the meridians and parallels for a map of Britain. That iſland is known to lie between 50 and 60 degrees of latitude, and two and ſeven of longitude. Having therefore choſen the length of your degrees of latitude, you muſt next proportion your degrees of longitude to it. By the table you find, that in the latitude of 50° the length of a degree of longitude is to one of latitude as 38,57 is to 60; that is, a degree of longitude in latitude 50 is ſomewhat more than half the length of a degree of latitude. The exact proportion may eaſily be taken by a diagonal ſcale; after which, you are to mark out ſeven or eight of thoſe degrees upon a right line for the length of your intended map. On the extremities of this line raiſe two perpendiculars, upon which mark out ten degrees of latitude for the height of it. Then, having completed the parallelogram, conſult the table for the length of a degree of longitude in lat. 60°, which is found to be very nearly one-half a degree of latitude. It will always be proper, however, to draw a vertical meridian exactly in the middle of the parallelogram, to which the meridian on each ſide may converge; and from this you are to ſet off the degrees of longitude on each ſide. Then, having divided the lines bounding your map into as many parts as can conveniently be done, to ſerve for a ſcale, you may by their means ſet off the longitudes and latitudes with much leſs trouble than where curve lines are uſed. This method may always be followed where a particular kingdom is to be delineated, and will repreſent the true figure and ſituation of the places with tolerable exactneſs. The particular points of the compaſs on which the towns lie with reſpect to one another, or their bearings, cannot be exactly known, except by a globe or Mercator's projection. Their diſtances, however, may by this means be accurately expreſſed, and this is the only kind of maps to which a ſcale of miles can be truly adapted.

§ 2. *Deſcription and Uſe of the Globes and Armillary Sphere.*

When we have thus diſcovered, by means of maps, or any other way, the true ſituation of the different places of the earth with regard to one another, we may eaſily know every other particular relative to them; as, how far diſtant they are from us, what hour of the day it is, what ſeaſon of the year, &c. at any particular place. As each of theſe problems, however, would require a particular and ſometimes troubleſome calculation, machines have been invented, by which all the calculations may be ſaved, and every problem in geography may be ſolved mechanically, and in the moſt eaſy and expeditious manner. Theſe machines are the celeſtial and terreſtrial globes, and the armillary ſphere; of which, and the method of uſing them, we proceed to give a deſcription.

74 The terreſtrial globe.

If a map of the world be accurately delineated on a ſpherical ball, the ſurface thereof will repreſent the ſurface of the earth: for the higheſt hills are ſo inconſiderable with reſpect to the bulk of the earth, that they take off no more from its roundneſs than grains of ſand do from the roundneſs of a common globe; for the diameter of the earth is 8000 miles in round numbers, and no known hill upon it is much above three miles in perpendicular height.

With regard to what we call *up* and *down*, ſee the article Gravity.

To an obſerver placed any where in the indefinite ſpace, where there is nothing to limit his view, all remote objects appear equally diſtant from him; and ſeem to be placed in a vaſt concave ſphere, of which his eye is the centre. The moon is much nearer to us than the ſun; ſome of the planets are ſometimes nearer and ſometimes farther from us than the ſun; others of them never come ſo near to us as the ſun always is; the remoteſt planet in our ſyſtem is beyond compariſon nearer to us than any of the fixed ſtars are: and yet all theſe celeſtial objects appear equally diſtant from us.

75 The face of the heavens and of the earth repreſented in a machine.

Therefore, if we imagine a large hollow ſphere of glaſs to have as many brights ſtuds fixed to its inſide as there are ſtars viſible in the heaven, and theſe ſtuds to be of different magnitudes, and placed at the ſame angular diſtances from each other as the ſtars are; the ſphere will be a true repreſentation of the ſtarry heaven, to an eye ſuppoſed to be in its centre, and viewing it all around. And if a ſmall globe, with a map of the earth upon it, be placed on an axis in the centre of this ſtarry ſphere, and the ſphere be made to turn round on this axis, it will repreſent the apparent motion of the heavens round the earth.

If a great circle be ſo drawn upon this ſphere as to divide it into two equal parts or hemiſpheres, and the plane of the circle be perpendicular to the axis of the ſphere, this circle will repreſent the *equinoctial*, which divides the heaven into two equal parts, called the *northern* and the *ſouthern hemiſpheres*; and every point of that circle will be equally diſtant from the *poles*, or ends of the axis in the ſphere. That pole which is in the middle of the northern hemiſphere, will be called the *north pole of the ſphere*; and that which is in the middle of the ſouthern hemiſphere, the *ſouth pole*.

If another grand circle be drawn upon the ſphere in ſuch a manner as to cut the equinoctial at an angle of 23½ degrees in two oppoſite points, it will repreſent the *ecliptic*, or circle of the ſun's apparent annual motion; one half of which is on the north ſide of the equinoctial, and the other half on the ſouth.

If a large ſtud be made to move eaſtward in this ecliptic in ſuch a manner as to go quite round it in the time that the ſphere is turned round weſtward 366 times upon its axis, this ſtud will repreſent the *ſun* changing his place every day a 365th part of the ecliptic, and going round weſtward the ſame way as the ſtars do; but with a motion ſo much ſlower than the motion of the ſtars, that they will make 366 revolutions about the axis of the ſphere in the time that the ſun makes only 365. During one half of theſe revolutions, the ſun will be on the north ſide of the equinoctial; during the other half, on the ſouth; and at the end of each half, in the equinoctial.

If we ſuppoſe the terreſtrial globe in this machine to be about one inch in diameter, and the diameter of the ſtarry ſphere to be about five or ſix feet, a ſmall inſect on the globe would ſee only a very little portion of its ſurface; but it would ſee one half of the ſtarry ſphere, the convexity of the globe hiding the other half from its view. If the ſphere be turned weſtward round the globe, and the inſect could judge of the appearances which ariſe from that motion, it would ſee ſome ſtars riſing to its view in the eaſtern ſide of the ſphere, whilſt others were ſetting on the weſtern: but as all the ſtars are fixed to the ſphere, the ſame ſtars would always riſe in the ſame points of view on the eaſt ſide, and ſet in the ſame points of view on the weſt ſide. With the ſun it would be otherwiſe; becauſe the ſun is not fixed to any point of the ſphere, but moves ſlowly along an oblique circle in it. And if the inſect ſhould look towards the ſouth, and call that point of the globe, where the equinoctial in the ſphere ſeems to cut it on the left ſide, the eaſt point; and where it cuts the globe on the right ſide, the weſt point; the little animal would ſee the ſun riſe north of the eaſt, and ſet north of the weſt, for 182½ revolutions; after which for as many more, the ſun would riſe ſouth of the eaſt, and ſet ſouth of the weſt. And in the whole 365 revolutions, the ſun would riſe only twice in the eaſt point, and ſet twice in the weſt. All theſe appearances would be the ſame, if the ſtarry ſphere ſtood ſtill (the ſun only moving in the ecliptic), and the earthly globe were turned round the axis of the ſphere eaſtward. For, as the inſect would be carried round with the globe, he would be quite inſenſible of its motion, and the ſun and ſtars would appear to move weſtward..

1. *Deſcription of the Terreſtrial Globe.*

76 The terreſtrial globe, deſcribed. Pl. CCXI. fig. 2.

The equator, ecliptic, and tropics, polar circles, and meridians, are laid down upon the globe in the manner already deſcribed. The ecliptic is divided into 12 ſigns, and each ſign into 30 degrees. Each tropic is 23½ degrees from the equator, and each polar circle 23½ degrees from its reſpective pole. Circles are drawn parallel to the equator, at every 10 degrees diſtance from it on each ſide to the poles: theſe circles are called *parallels of latitude*. On large globes there are circles drawn perpendicularly through every tenth degree of the equator, interſecting each other at the poles: but on globes of or under a foot diameter, they are only drawn through every fifteenth degree of the equator; theſe circles are generally called *meridians*, ſometimes *circles of longitude*, and at other times *hour circles*.

The globe is hung in a braſs ring (A), called the *braſen meridian*, and turns upon a wire in each pole ſunk half its thickneſs into one ſide of the meridian ring; by which means that ſide of the ring divides the globe into two equal parts, called the *eaſtern* and *weſtern hemiſpheres*; as the equator divides it into two equal parts, called the *northern* and *ſouthern hemiſpheres*. The ring is divided into 360 equal parts or degrees, on the ſide wherein the axis of the globe turns. One half of theſe degrees are numbered, and reckoned, from the equator to the poles, where they end at 90: their uſe is to ſhow the latitudes of places. The degrees of the other half of the meridian are numbered from the poles to the equator, where they end at 90: their uſe is to ſhow how to elevate either the north or ſouth pole above the horizon, according to the latitude of any given place, as it is north or ſouth of the equator.

The braſen meridian is let into two notches made in a broad flat ring called the *wooden horizon*, B, C; the upper ſurface of which divides the globe into two equal parts, called the *upper* and *lower hemiſpheres*. One notch is in the north point of the horizon, and the other in the ſouth. On this horizon are ſeveral concentric circles, which contain the months and days of the year, the ſigns and degrees anſwering to the ſun's place for each month and day, and the 32 points of the compaſs and the circles of amplitude and azimuth.—The graduated ſide of the braſen meridian lies towards the eaſt ſide of the horizon, and ſhould be generally kept towards the perſon who works problems by the globes.

There is a ſmall horary circle D, ſo fixed to the north part of the braſen meridian, that the wire in the north pole of the globe is in the centre of that circle; and on the wire is an index, which goes over all the 24 hours of the circle, as the globe is turned round its axis. Sometimes there are two horary circles, one between each pole of the globe and the braſen meridian.

There is a thin ſlip of braſs, called the *quadrant of altitude*, which is divided into 90 equal parts or degrees, anſwering exactly to ſo many degrees of the equator. It is occaſionally fixed to the uppermoſt point of the braſen meridian by a nut and ſcrew. The diviſions end at the nut E, and the quadrant is turned round upon it.

There is alſo applied occaſionally to the globe a magnetic needle, freely moving over a circle divided into

GEOGRAPHY

Fig. 1.

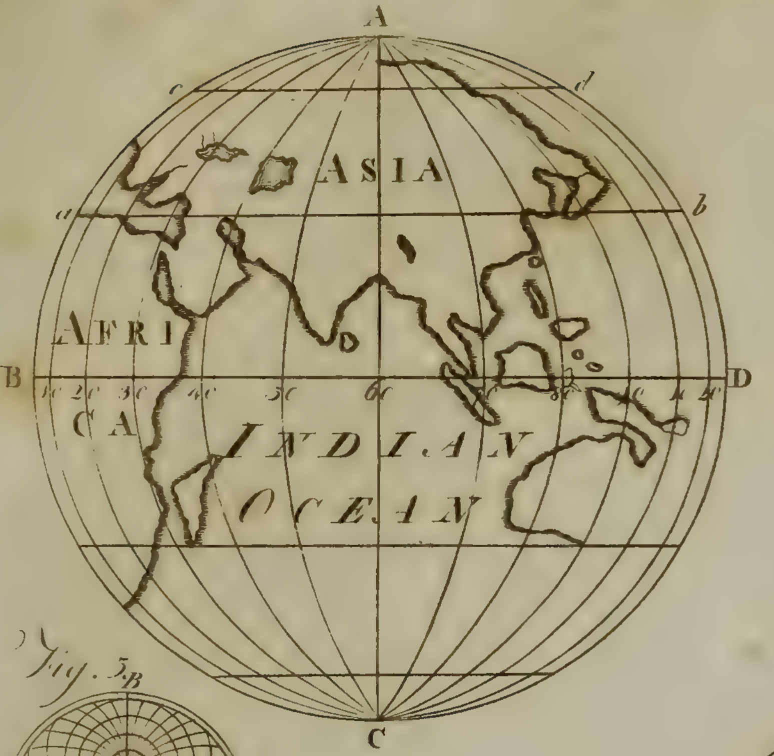


Fig. 2.

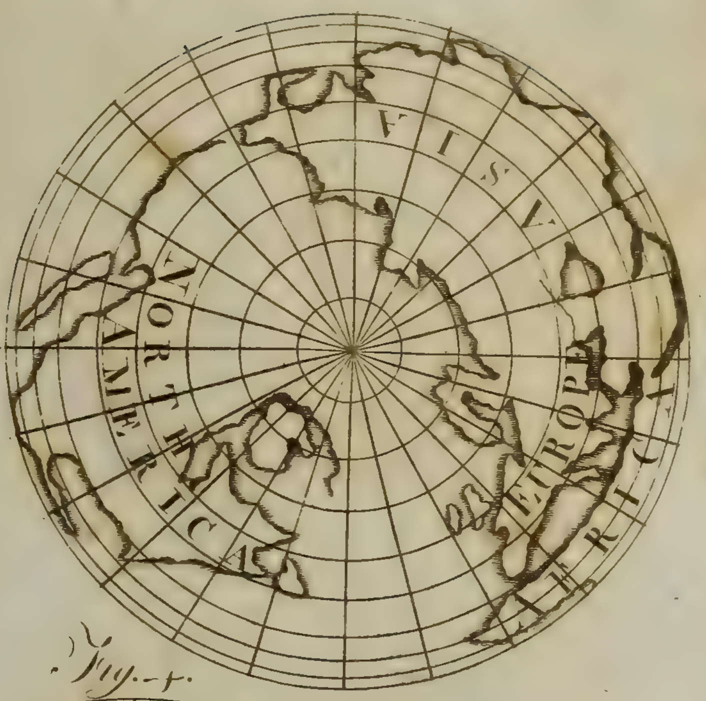


Fig. 5.

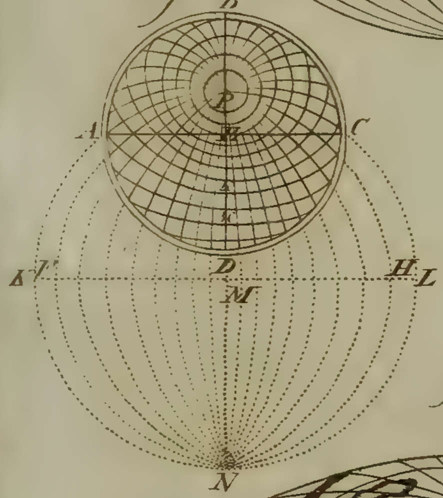


Fig. 4.

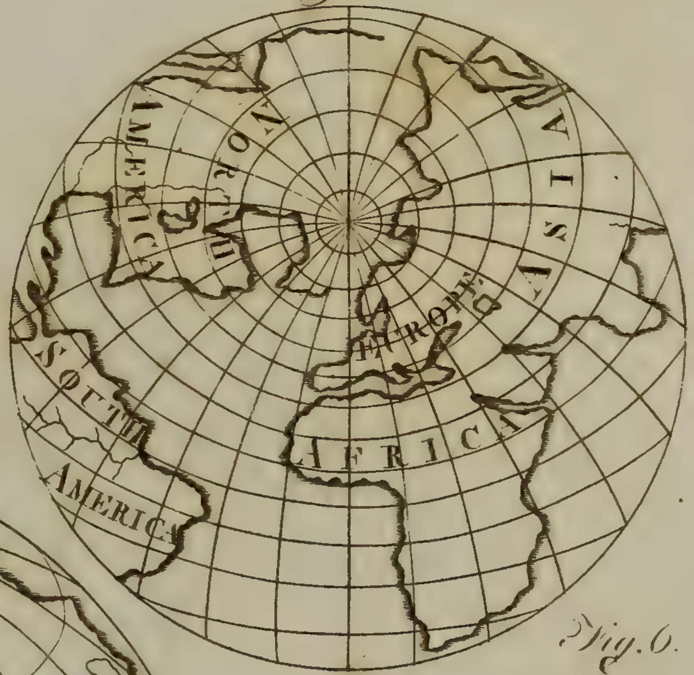
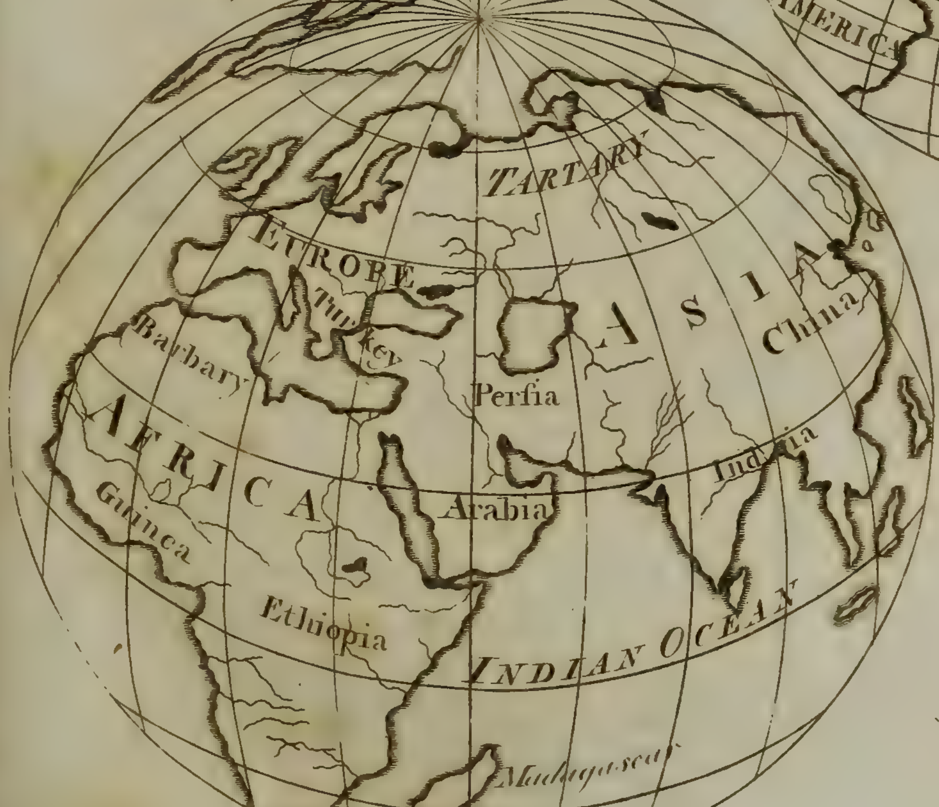


Fig. 3.



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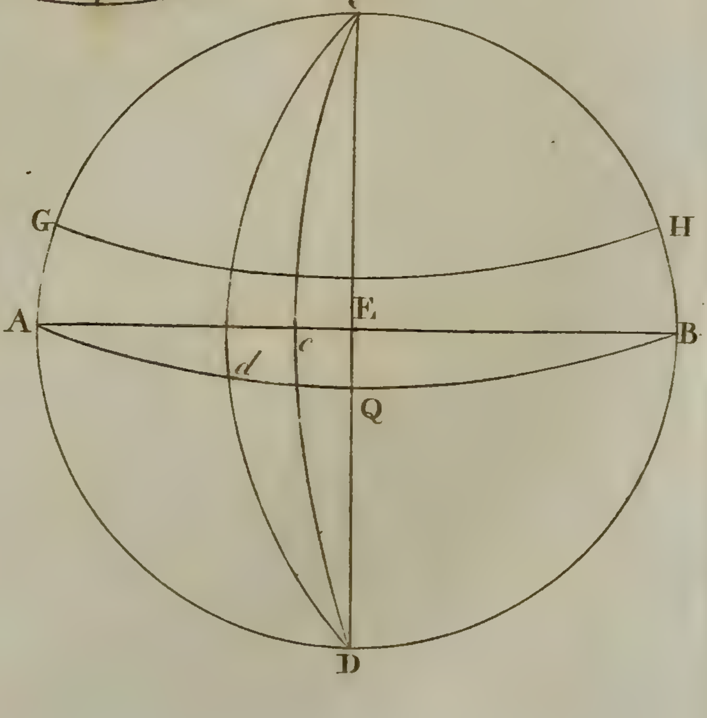


GEOGRAPHY.

Plate CCX

Fig. 1.

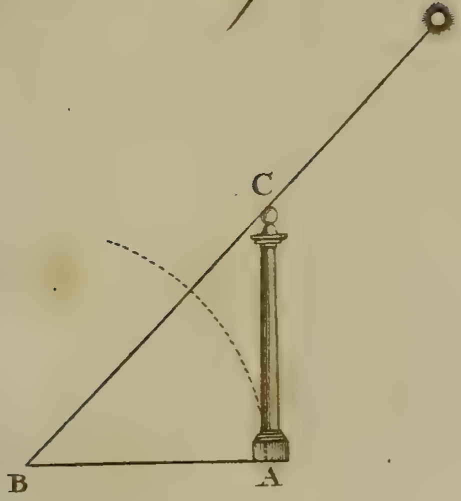


Fig. 2.

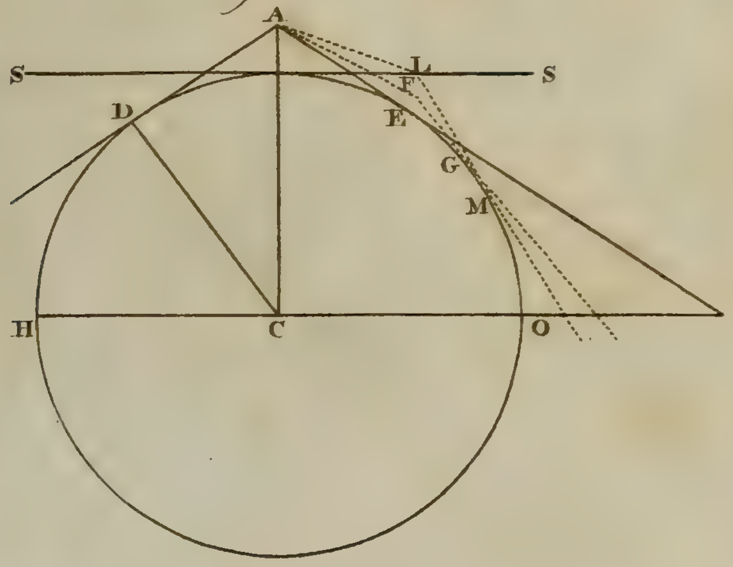


Fig. 3.

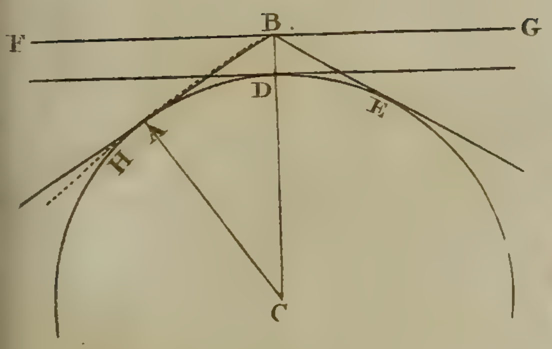


Fig. 4.

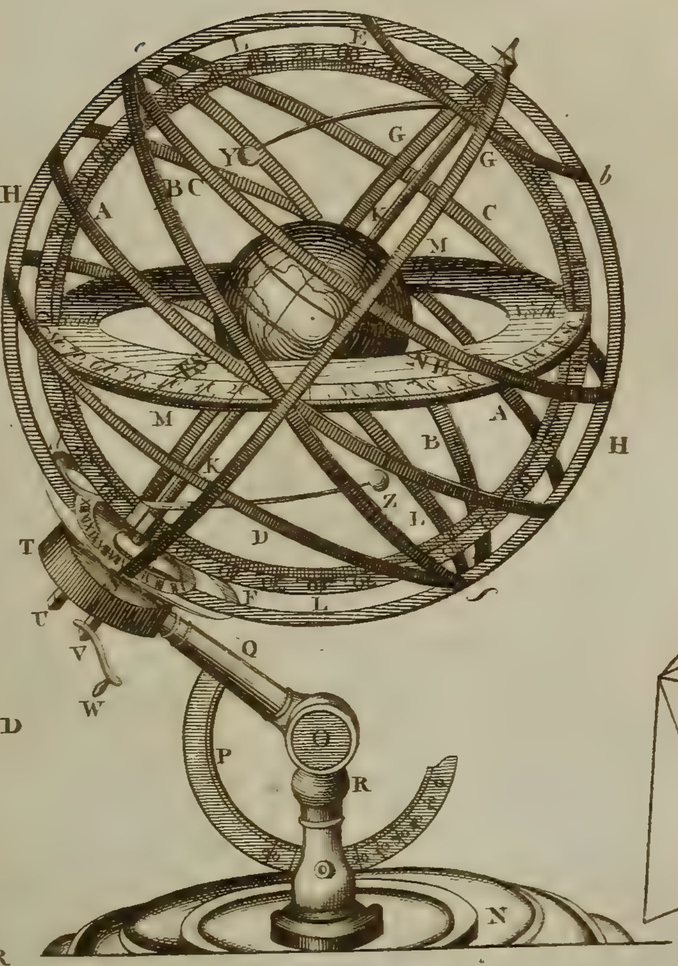


Fig. 5.

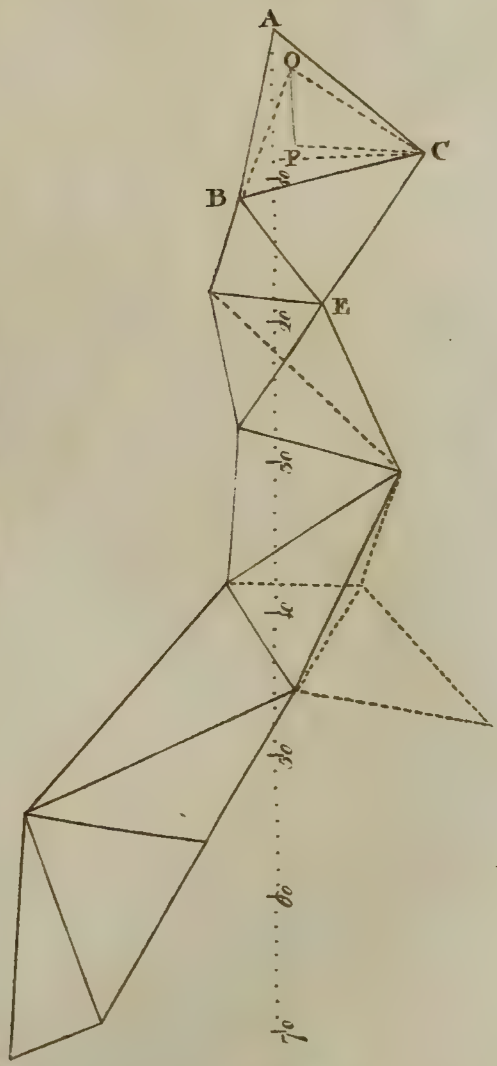
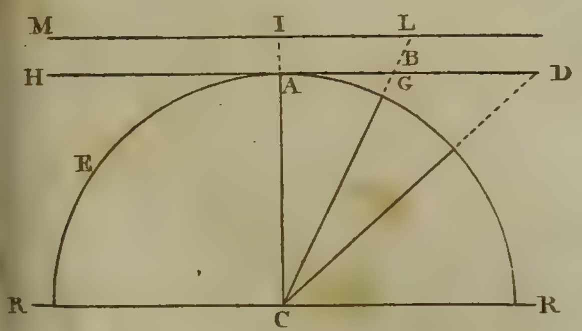


Fig. 6.



H. Barker sculp.

into four times 90 degrees; reckoning from the north and ſouth points towards the eaſt and weſt, and alſo into the 32 points of the compaſs. As this needle makes nearly a certain conſtant angle with the meridian in every place, called the *variation;* therefore this compaſs being added to the frame, will rectify the poſition of the meridian of the globe when the variation of the needle is known. Thus at London, the variation of the needle is at this time about 23 degrees weſtward; therefore, by moving the frame of the globe about till the needle ſettles itſelf over the 23d degree, reckoning weſtward from the north point or *fleur de lis,* we ſhall have the braſs meridian coinciding with the true meridian. The compaſs is ſometimes fixed between the legs underneath the globe.

2. *Deſcription and Uſe of the Armillary Sphere.*

77
Armillary ſphere deſcribed.
Plate CCX. fig. 4.

The exterior parts of this machine are, a compages of braſs rings, which repreſent the principal circles of the heaven, viz. 1. The equinoctial AA, which is divided into 360 degrees (beginning at its interſection with the ecliptic in Aries), for ſhowing the ſun's right aſcenſion in degrees; and alſo into 24 hours, for ſhowing his right aſcenſion in time. 2. The ecliptic BB, which is divided into 12 ſigns, and each ſign into 30 degrees, and alſo into the months and days of the year; in ſuch a manner, that the degree or point of the ecliptic in which the ſun is, on any given day, ſtands over that day in the circle of months. 3. The tropic of Cancer CC, touching the ecliptic at the beginning of Cancer in *e*, and the tropic of Capricorn DD, touching the ecliptic at the beginning of Capricorn in *f*; each $23\frac{1}{2}$ degrees from the equinoctial circle. 4. The arctic circle E, and the antarctic circle F, each $23\frac{1}{2}$ degrees from its reſpective pole at N and S. 5. The equinoctial colure GG, paſſing through the north and ſouth poles of the heaven at N and S, and through the equinoctial points Aries and Libra, in the ecliptic. 6. The ſolſtitial colure HH, paſſing through the poles of the heaven, and through the ſolſtitial points Cancer and Capricorn in the ecliptic. Each quarter of the former of theſe colures is divided into 90 degrees, from the equinoctial to the poles of the world, for ſhowing the declination of the ſun, moon, and ſtars; and each quarter of the latter, from the ecliptic at *e* and *f*, to its poles *b* and *d*, for ſhowing the latitude of the ſtars.

In the north pole of the ecliptic is a nut *b*, to which is fixed one end of a quadrantal wire, and to the other end a ſmall ſun Y, which is carried round the ecliptic BB, by turning the nut: and in the ſouth pole of the ecliptic is a pin *d*, on which is another quadrantal wire, with a ſmall moon Z upon it, which may be moved round by the hand: but there is a particular contrivance for cauſing the moon to move in an orbit which croſſes the ecliptic at an angle of $5\frac{1}{3}$ degrees, in two oppoſite points called the *moon's nodes*; and alſo for ſhifting theſe points backward in the ecliptic, as the moon's nodes ſhift in the heaven.

Within theſe circular rings is a ſmall terreſtrial globe I, fixed on an axis KK, which extends from the north and ſouth poles of the globe at *n* and *s*, to thoſe of the celeſtial ſphere at N and S. On this axis is fixed the flat celeſtial meridian LL, which may be ſet directly over the meridian of any place on the globe, and then turned round with the globe, ſo as to keep over the ſame meridian upon it. This flat meridian is graduated the ſame way as the braſs meridian of a common globe, and its uſe is much the ſame. To this globe is fitted the moveable horizon MM, ſo as to turn upon two ſtrong wires proceeding from its eaſt and weſt points to the globe, and entering the globe at the oppoſite points of its equator, which is a moveable braſs ring let into the globe in a groove all around its equator. The globe may be turned by hand within this ring, ſo as to place any given meridian upon it, directly under the celeſtial meridian LL. The horizon is divided into 360 degrees all around its outermoſt edge, within which are the points of the compaſs for ſhowing the amplitude of the ſun and moon both in degrees and points. The celeſtial meridian LL, paſſes through two notches in the north and ſouth points of the horizon, as in a common globe: but here, if the globe be turned round, the horizon and meridian turn with it. At the ſouth pole of the ſphere is a circle of 24 hours, fixed to the rings: and on the axis is an index which goes round that circle, if the globe be turned round its axis.

The whole fabric is ſupported on a pedeſtal N, and may be elevated or depreſſed upon the joint O, to any number of degrees from 0 to 90, by means of the arc P, which is fixed in the ſtrong braſs arm Q, and ſlides in the upright piece R, in which is a ſcrew at *r*, to fix it any proper elevation.

In the box T are two wheels (as in Dr Long's ſphere), and two pinions, whoſe axes come out at V, and U; either of which may be turned by the ſmall winch W. When the winch is put upon the axis V. and turned backward, the terreſtrial globe, with its horizon and celeſtial meridian, keep at reſt; and the whole ſphere of circles turns round from eaſt, by ſouth, to weſt, carrying the ſun Y, and moon Z, round the ſame way, and cauſing them to riſe above and ſet below the horizon. But when the winch is put upon the axis U, and turned forward, the ſphere with the ſun and moon keep at reſt; and the earth, with its horizon and meridian, turn round from weſt, by ſouth, to eaſt; and bring the ſame points of the horizon to the ſun and moon, to which theſe bodies came when the earth kept at reſt and they were carried round it; ſhowing that they riſe and ſet in the ſame points of the horizon, and at the ſame times in the hour-circle, whether the motion be in the earth or in the heaven. If the earthly globe be turned, the hour-index goes round its hour-circle; but if the ſphere be turned, the hour-circle goes round below the index.

And ſo, by this conſtruction, the machine is equally fitted to ſhow either the real motion of the earth or the apparent motion of the heaven.

To rectify the ſphere for uſe, firſt ſlacken the ſcrew *r* in the upright ſtem R, and taking hold of the arm Q, move it up or down until the given degree of latitude for any place be at the ſide of the ſtem R; and then the axis of the ſphere will be properly elevated ſo as to ſtand parallel to the axis of the world, if the machine be ſet north and ſouth by a ſmall compaſs: this done, count the latitude from the north pole, upon the celeſtial meridian LL, down towards the north notch of the horizon, and ſet the horizon to that latitude; then turn the nut *b* until the ſun Y comes to the given day of the year in the ecliptic, and the ſun will be at its proper place for that day; find the place of the moon's aſcending node, and alſo the place of the moon, by an ephemeris, and ſet them right accordingly: laſtly, turn the winch W, until either the ſun comes to the meridian LL, or until the meridian comes to the ſun (according as you want the ſphere or earth to move), and ſet the hour-index to the XII, marked noon, and the whole machine will be rectified. Then turn the winch, and obſerve when the ſun or moon riſe and ſet in the horizon, and the hour-index will ſhew the times thereof for the given-day.

As thoſe who underſtand the uſe of the globes will be at no loſs to work many other problems by this ſphere, it is needleſs to enlarge any farther upon it.

3. *Directions for uſing the Globes.*

In uſing globes, keep the eaſt ſide of the horizon towards you (unleſs the problem requires the turning of it), which ſide you may know by the word Eaſt upon the horizon; for then you have the graduated ſide of the meridian towards you, the quadrant of altitude before you, and the globe divided exactly into two equal parts, by the graduated ſide of the meridian.

78
Directions for uſing the terreſtrial globe.

In working ſome problems, it will be neceſſary to turn the whole globe and horizon about, that you may look on the weſt ſide thereof: which turning will be apt to jog the ball ſo, as to ſhift away the degree of the globe which was before ſet to the horizon or meridian: to avoid which inconvenience, you may thruſt in the feather-end of a quill between the ball of the globe and the brazen meridian; which, without hurting the ball, will keep it from turning in the meridian, whilſt you turn the weſt ſide of the horizon towards you.

Prob. I. *To find the latitude and longitude of any given place upon the globe*—Turn the globe on its axis, until the given place comes exactly under that graduated ſide of the braſen meridian on which the degrees are numbered from the equator; and obſerve what degree of the meridian the place then lies under; which is its latitude, north or ſouth, as the place is north or ſouth of the equator.

The globe remaining in this poſition, the degree of the equator, which is under the braſen meridian, is the longitude of the place, which is eaſt or weſt, as the place lies on the eaſt or weſt ſide of the firſt meridian of the globe.—All the Atlantic ocean, and America, is on the weſt ſide of the meridian of London; and the greateſt part of Europe, and of Africa, together with all Aſia, is on the eaſt ſide of the meridian of London, which is reckoned the firſt meridian of the globe by the Britiſh geographers and aſtronomers.

Prob. II. *The longitude and latitude of a place being given, to find that place on the globe.*—Look for the given longitude in the equator (counting it eaſtward or weſtward from the firſt meridian, as it is mentioned to be eaſt or weſt); and bringing the point of longitude in the equator to the braſen meridian, on that ſide which is above the ſouth point of the horizon: then count from the equator, on the braſen meridian, to the degree of the given latitude, towards the north or ſouth pole, according as the latitude is north or ſouth; and under that degree of latitude on the meridian you will have the place required.

Prob. III. *To find the difference of longitude, or difference of latitude, between any two given places.*—Bring each of theſe places to the braſen meridian, and ſee what its latitude is: the leſſer latitude ſubtracted from the greater, if both places are on the ſame ſide of the equator, or both latitudes added together if they are on different ſides of it, is the difference of latitude required. And the number of degrees contained between theſe places, reckoned on the equator, when they are brought ſeparately under the braſen meridian, is their difference of longitude, if it be leſs than 180; but if more, let it be ſubtracted from 360, and the remainder is the difference of longitude required. Or,

Having brought one of the places to the braſen meridian, and ſet the hour-index to XII, turn the globe until the other place comes to the braſen meridian; and the number of hours and parts of an hour, paſſed over by the index, will give the longitude in time; which may be eaſily reduced to degrees, by allowing 15 degrees for every hour, and one degree for every four minutes.

N. B. When we ſpeak of bringing any place to the braſen meridian, it is the graduated ſide of the meridian that is meant.

Prob. IV. *Any place being given, to find all thoſe places that have the ſame longitude or latitude with it.*—Bring the given place to the braſen meridian; then all thoſe places which lie under that ſide of the meridian, from pole to pole, have the ſame longitude with the given place. Turn the globe round its axis; and all thoſe places which paſs under the ſame degree of the meridian that the given place does, have the ſame latitude with that place.

Since all latitudes are reckoned from the equator, and all longitudes are reckoned from the firſt meridian, it is evident, that the point of the equator which is cut by the firſt meridian, has neither latitude nor longitude.—The greateſt latitude is 90 degrees, becauſe no place is more than 90 degrees from the equator: And the greateſt longitude is 180 degrees, becauſe no place is more than 180 degrees from the firſt meridian.

Prob. V. *To find the* antœci, periœci, *and* antipodes, *of any given place.*—Bring the given place to the braſen meridian; and having found its latitude, keep the globe in that ſituation, and count the ſame number of degrees of latitude from the equator towards the contrary pole; and where the reckoning ends, you have the *antœci* of the given place upon the globe. Thoſe who live at the equator have no *antœci*.

The globe remaining in the ſame poſition, ſet the hour-index to the upper XII on the horary circle, and turn the globe until the index comes to the lower XII; then the place which lies under the meridian, in the ſame latitude with the given place, is the *periœci* required. Thoſe who live at the poles have no *periœci*.

As the globe now ſtands (with the index at the lower XII), the *antipodes* of the given place will be under the ſame point of the braſen meridian where its *antœci* ſtood before. Every place upon the globe has its *antipodes*.

Prob. VI. *To find the diſtance between any two places*

places on the globe.—Lay the graduated edge of the quadrant of altitude over both the places, and count the number of degrees intercepted between them on the quadrant; then multiply theſe degrees by 60, and the product will give the diſtance in geographical miles: but to find the diſtance in miles, multiply the degrees by 69½, and the product will be the number of miles required. Or, take the diſtance betwixt any two places with a pair of compaſſes, and apply that extent to the equator; the number of degrees, intercepted between the points of the compaſſes, is the diſtance in degrees of a great circle; which may be reduced either to geographical miles, or to Engliſh miles, as above.

Prob. VII. *A place on the globe being given, and its diſtance from any other place; to find all the other places upon the globe which are at the ſame diſtance from the given place.*—Bring the given place to the braſen meridian, and ſcrew the quadrant of altitude to the meridian directly over that place; then keeping the globe in that poſition, turn the quadrant quite round upon it, and the degree of the quadrant that touches the ſecond place will paſs over all the other places which are equally diſtant with it from the given place.

This is the ſame as if one foot of a pair of compaſſes was ſet in the given place, and the other foot extended to the ſecond place, whoſe diſtance is known; for if the compaſſes be then turned round the firſt place as a centre, the moving foot will go over all thoſe places which are at the ſame diſtance with the ſecond from it.

Prob. VIII. *The hour of the day at any place being given, to find all thoſe places where it is noon at that time.*—Bring the given place to the braſen meridian, and ſet the index to the given hour; this done, turn the globe until the index points to the upper XII, and then all the places that lie under the braſen meridian have noon at that time.

N. B. The upper XII always ſtands for noon; and when the bringing of any place to the braſen meridian is mentioned, the ſide of that meridian on which the degrees are reckoned from the equator is meant, unleſs the contrary ſide be mentioned.

Prob. IX. *The hour of the day at any place being given, to find what o'clock it then is at any other place.*—Bring the given place to the braſen meridian, and ſet the index to the given hour; then turn the globe, until the place where the hour is required comes to the meridian, and the index will point out the hour at that place.

Prob. X. *To find the ſun's place in the ecliptic, and his declination, for any given day of the year*—.Look on the horizon for the given day, and right againſt it you have the degree of the ſign in which the ſun is (or his place) on that day at noon. Find the ſame degree of that ſign in the ecliptic line upon the globe, and having brought it to the braſen meridian, obſerve what degree of the meridian ſtands over it; for that is the ſun's declination, reckoned from the equator.

Prob. XI. *The day of the month being given, to find all thoſe places of the earth over which the ſun will paſs vertically on that day.*—Find the ſun's place in the ecliptic for the given day, and having brought it to the brazen meridian, obſerve what point of the meridian is over it; then, turning the globe round its axis, all thoſe places which paſs under that point of the meridian are the places required; for as their latitude is equal, in degrees and parts of a degree, to the ſun's declination, the ſun muſt be directly over-head to each of them at its reſpective noon.

Prob. XII. *A place being given in the torrid zone, to find thoſe two days of the year on which the ſun ſhall be vertical to that place.*—Bring the given place to the braſen meridian, and mark the degree of latitude that is exactly over it on the meridian; then turn the globe round its axis, and obſerve the two degrees of the ecliptic which paſs exactly under that degree of latitude: laſtly, find on the wooden horizon the two days of the year in which the ſun is in thoſe degrees of the ecliptic, and they are the days required: for on them, and none elſe, the ſun's declination is equal to the latitude of the given place; and, conſequently, he will then be vertical to it at noon.

Prob. XIII. *To find all thoſe places of the north frigid zone, where the ſun begins to ſhine conſtantly without ſetting, on any given day, from the 21ſt of March to the 23d of September.*—On theſe two days, the ſun is in the equinoctial, and enlightens the globe exactly from pole to pole: therefore, as the earth turns round its axis, which terminates in the poles, every place upon it will go equally through the light and the dark, and ſo make the day and night equal to all places of the earth. But as the ſun declines from the equator, towards either pole, he will ſhine juſt as many degrees round that pole as are equal to his declination from the equator: ſo that no place within that diſtance of the pole will then go through any part of the dark, and conſequently the ſun will not ſet to it. Now, as the ſun's declination is northward from the 21ſt of March to the 23d of September, he muſt conſtantly ſhine round the north pole all that time; and on the day that he is in the northern tropic, he ſhines upon the whole north frigid zone; ſo that no place within the north polar circle goes through any part of the dark on that day. Therefore,

Having brought the ſun's place for the given day to the braſen meridian, and found his declination (by Prob. IX) count as many degrees on the meridian, from the north pole, as are equal to the ſun's declination from the equator, and mark that degree from the pole where the reckoning ends; then turning the globe round its axis, obſerve what places in the north frigid zone paſs directly under that mark; for they are the places required.

The like may be done for the ſouth frigid zone, from the 23d of September to the 21ſt of March, during which time the ſun ſhines conſtantly on the ſouth pole.

Prob. XIV. *To find the place over which the ſun is vertical at any hour of a given day.*—Having found the ſun's declination for the given day (by Prob. X.) mark it with a chalk on the braſen meridian: then bring the place where you are (ſuppoſe Philadelphia) to the braſen meridian, and ſet the index to the given hour; which done, turn the globe on its axis, until the index points to XII at noon; and the place on the globe, which is then directly under the point of the

the ſun's declination marked upon the meridian, has the ſun that moment in the zenith, or directly over head.

Prob. XV. *The day and hour of a lunar eclipſe being given; to find all thoſe places of the earth to which it will be viſible.*—The moon is never eclipſed but when ſhe is full, and ſo directly oppoſite to the ſun, that the earth's ſhadow falls upon her. Therefore, whatever place of the earth the ſun is vertical to at that time, the moon muſt be vertical to the antipodes of that place: ſo that the ſun will be then viſible to one half of the earth, and the moon to the other.

Find the place to which the ſun is vertical at the given hour (by Prob. XIV.) elevate the pole to the latitude of that place, and bring the place to the upper part of the braſen meridian, as in the former problem: then, as the ſun will be viſible to all thoſe parts of the globe which are above the horizon, the moon will be viſible to all thoſe parts which are below it, at the time of her greateſt obſcuration.

Prob. XVI. *To rectify the globe for the latitude, the zenith, and the ſun's place.*—Find the latitude of the place (by Prob. I.) and if the place be in the northern hemiſphere, raiſe the north pole above the north point of the horizon, as many degrees (counted from the pole upon the braſen meridian) as are equal to the latitude of the place. If the place be in the ſouthern hemiſphere, raiſe the ſouth pole above the ſouth point of the horizon as many degrees as are equal to the latitude. Then, turn the globe till the place comes under its latitude on the braſen meridian, and faſten the quadrant of altitude ſo, that the chamfered edge of its nut (which is even with the graduated edge) may be joined to the zenith, or point of latitude. This done, bring the ſun's place in the ecliptic for the given day (found by Prob. X.) to the graduated ſide of the braſen meridian, and ſet the hour-index to XII at noon, which is the uppermoſt XII on the hour-circle; and the globe will be rectified.

Prob. XVII. *The latitude of any place, not exceeding 66½ degrees, and the day of the month, being given; to find the time of the ſun's riſing and ſetting, and conſequently the length of the day and night.*—Having rectified the globe for the latitude, and for the ſun's place on the given day (as directed in the preceding problem), bring the ſun's place in the ecliptic to the eaſtern ſide of the horizon, and the hour-index will ſhow the time of ſun-riſing; then turn the globe on its axis, until the ſun's place comes to the weſtern ſide of the horizon, and the index will ſhow the time of ſun-ſetting.

The hour of ſun-ſetting doubled, gives the length of the day; and the hour of ſun-riſing doubled, gives the length of the night.

Prob. XVIII. *The latitude of any place, and the day of the month, being given; to find when the morning twilight begins, and the evening twilight ends, at that place.* This problem is often limited: for, when the ſun does not go 18 degrees below the horizon, the twilight continues the whole night; and for ſeveral nights together in ſummer, between 49 and 66½ degrees of latitude; and the nearer to 66½, the greater is the number of theſe nights. But when it does begin and end, the following method will ſhow the time for any given day.

Rectify the globe, and bring the ſun's place in the ecliptic to the eaſtern ſide of the horizon; then mark with a chalk that point of the ecliptic which is in the weſtern ſide of the horizon, it being the point oppoſite to the ſun's place: this done, lay the quadrant of altitude over the ſaid point, and turn the globe eaſtward, keeping the quadrant at the chalk mark, until it is juſt 18 degrees high on the quadrant; and the index will point out the time when the morning twilight begins: for the ſun's place will then be 18 degrees below the eaſtern ſide of the horizon. To find the time when the evening twilight ends, bring the ſun's place to the weſtern ſide of the horizon; and the point oppoſite to it, which was marked with the chalk, will be riſing in the eaſt: then, bring the quadrant over that point, and keeping it thereon, turn the globe weſtward, until the ſaid point be 18 degrees above the horizon on the quadrant, and the index will ſhow the time when the evening twilight ends; the ſun's place being then 18 degrees below the weſtern ſide of the horizon.

Prob. XIX. *To find on what day of the year the ſun begins to ſhine conſtantly, without ſetting, on any given place in the north frigid zone; and how long he continues to do ſo.*—Rectify the globe to the latitude of the place, and turn it about until ſome point of the ecliptic, between Aries and Cancer, coincides with the north point of the horizon where the braſen meridian cuts it; then find, on the wooden horizon, what day of the year the ſun is in that point of the ecliptic; for that is the day on which the ſun begins to ſhine conſtantly on the given place without ſetting. This done, turn the globe, until ſome point of the ecliptic, between Cancer and Libra, coincides with the north point of the horizon, where the braſen meridian cuts it; and find, on the wooden horizon, on what day the ſun is in that point of the ecliptic; which is the day that the ſun leaves off conſtantly ſhining on the ſaid place, and riſes and ſets to it as to other places on the globe. The number of natural days, or complete revolutions of the ſun about the earth, between the two days above found, is the time that the ſun keeps conſtantly above the horizon without ſetting: for all that portion of the ecliptic, which lies between the two points which interſect the horizon in the very north, never ſets below it; and there is juſt as much of the oppoſite part of the ecliptic that never riſes: therefore, the ſun will keep as long conſtantly below the horizon in winter as above it in ſummer.

Prob. XX. *To find in what latitude the ſun ſhines conſtantly without ſetting, for any length of time leſs than 182½ of our days and nights.*—Find a point in the ecliptic half as many degrees from the beginning of Cancer (either toward Aries or Libra) as there are natural days in the time given; and bring that point to the north ſide of the braſen meridian, on which the degrees are numbered from the pole towards the equator: then keep the globe from turning on its axis, and ſlide the meridian up or down until the foreſaid point of the ecliptic comes to the north point of the horizon, and then the elevation of the pole will be equal to the latitude required.

Prob. XXI. *The latitude of a place, not exceeding 66½ degrees, and the day of the month, being given; to find the ſun's amplitude or point of the compaſs on which he riſes or ſets.*—Rectify the globe, and bring the ſun's place to the eaſtern ſide of the horizon; then obſerve what point of the compaſs on the horizon ſtands right againſt the ſun's place, for that is his amplitude at riſing. This done, turn the globe weſtward, until the ſun's place comes to the weſtern ſide of the horizon, and it will cut the point of his amplitude at ſetting. Or you may count the riſing amplitude in degrees, from the eaſt point of the horizon, to that point where the ſun's place cuts it; and the ſetting amplitude from the weſt point of the horizon, to the ſun's place at ſetting.

Prob. XXII. *The latitude, the ſun's place, and his altitude, being given; to find the hour of the day, and the ſun's azimuth, or number of degrees that he is diſtant from the meridian.*—Rectify the globe, and bring the ſun's place to the given height upon the quadrant of altitude; on the eaſtern ſide of the horizon, if the time be in the forenoon; or the weſtern ſide, if it be in the afternoon: then the index will ſhow the hour; and the number of degrees in the horizon, intercepted between the quadrant of altitude and the ſouth point, will be the ſun's true azimuth at that time.

Prob. XXIII. *The latitude, hour of the day, and the ſun's place, being given; to find the ſun's altitude and azimuth.*—Rectify the globe, and turn it until the index points to the given hour; then lay the quadrant of altitude over the ſun's place in the ecliptic, and the degree of the quadrant cut by the ſun's place in his altitude at that time above the horizon; and the degree of the horizon cut by the quadrant is the ſun's azimuth, reckoned from the ſouth.

Prob. XXIV. *The latitude, the ſun's altitude, and his azimuth, being given; to find his place in the ecliptic the day of the month, and hour of the day, though they had all been loſt.*—Rectify the globe for the latitude and zenith, and ſet the quadrant of altitude to the given azimuth in the horizon; keeping it there, turn the globe on its axis until the ecliptic cuts the quadrant in the given altitude: that point of the ecliptic which cuts the quadrant there, will be the ſun's place; and the day of the month anſwering thereto, will be found over the like place of the ſun on the wooden horizon. Keep the quadrant of altitude in that poſition; and, having brought the ſun's place to the braſen meridian, and the hour index to XII at noon, turn back the globe, until the ſun's place cuts the quadrant of altitude again, and the index will ſhow the hour.

Any two points of the ecliptic, which are equidiſtant from the beginning of Cancer or Capricorn, will have the ſame altitude and azimuth at the ſame hour though the months be different; and therefore it requires ſome care in this problem, not to miſtake both the month and the day of the month; to avoid which, obſerve that from the 20th of March to the 21ſt of June, that part of the ecliptic which is between the beginning of Aries and beginning of Cancer is to be uſed; from the 21ſt of June to the 23d of September, between the beginning of Cancer and beginning of Libra; from the 23d of September to the 21ſt of December, between the beginning of Libra and the beginning of Capricorn; and from the 21ſt of December to the 20th of March, between the beginning of Capricorn and the beginning of Aries. And as one can never be at a loſs to know in what quarter of the year he takes the ſun's altitude and azimuth, the above caution with regard to the quarters of the ecliptic will keep him right as to the month and day thereof.

Prob. XXV. *To find the length of the longeſt day at an given place.*—If the place be on the north ſide of the equator, find its latitude (by Prob. I.) and elevate the north pole to that latitude; then bring the beginning of Cancer to the braſen meridian, and ſet the hour-index to XII at noon. But if the given place be on the ſouth ſide of the equator, elevate the ſouth pole to its latitude, and bring the beginning of Capricorn to the braſs meridian, and the hour-index to XII. This done, turn the globe weſtward until the beginning of Cancer and Capricorn (as the latitude is north or ſouth) comes to the horizon; and the index will then point out the time of ſun-ſetting, for it will have gone over all the afternoon hours, between mid-day and ſun-ſet; which length of time being doubled, will give the whole length of the day from ſun-riſing, to ſun-ſetting. For, in all latitudes, the ſun riſes as long before mid-day, as he ſets after it.

Prob. XXVI. *To find in what latitude the longeſt day is, of any given length, leſs than 24 hours.*—If the latitude be north, bring the beginning of Cancer to the braſen meridian, and elevate the north pole to about 66½ degrees; but if the latitude be ſouth, bring the beginning of Capricorn to the meridian, and elevate the ſouth pole to about 66½ degrees; becauſe the longeſt day in north latitude is, when the ſun is in the firſt point of Cancer; and in ſouth latitude, when he is in the firſt point of Capricorn. Then ſet the hour-index to XII at noon, and turn the globe weſtward until the index points at half the number of hours given; which done keep the globe from turning on its axis, and ſlide the meridian down in the notches, until the aforeſaid point of the ecliptic (viz. Cancer or Capricorn) comes to the horizon; then, the elevation of the pole will be equal to the latitude required.

Prob. XXVII. *The latitude of any place, not exceeding 66½ degrees, being given; to find in what climate the place is.*—Find the length of the longeſt day at the given place, by Prob. XXV. and whatever be the number of hours whereby it exceedeth twelve, double the number, and the ſum will give the climate in which the place is.

Prob. XXVIII. *The latitude, and the day of the month, being given; to find the hour of the day when the ſun ſhines.* Set the wooden horizon truly level, and the braſen meridian due north and ſouth by a mariner's compaſs; then, having rectified the globe, ſtick a ſmall ſewing needle into the ſun's place in the ecliptic, perpendicular to that part of the ſurface of the globe; this done, turn the globe on its axis, until the needle comes to the braſen meridian, and ſet the hour index to XII at noon: then turn the globe on its axis, until the needle points exactly towards the ſun (which it will do when it caſts no ſhadow on the globe), and the index will ſhow the hour of the day.

4. *The Uſe of the Celeſtial Globe.*

Having done for the preſent with the terreſtrial globe, we ſhall proceed to the uſe of the celeſtial; firſt premiſing, that as the equator, ecliptic, tropics, polar circles, horizon, and braſen meridian, are exactly alike on both globes, all the former problems concerning the ſun are ſolved the ſame way by both globes. The method alſo of rectifying the celeſtial globe is the ſame as rectifying the terreſtrial. *N. B.* The ſun's place for any day of the year ſtands directly over that day on the horizon of the celeſtial globe, as it does on that day of the terreſtrial.

80 Latitude and longitude of the ſtars.

The *latitude* and *longitude* of the ſtars, or of all other celeſtial phenomena, are reckoned in a very different manner from the latitude and longitude of places on the earth: for all terreſtrial latitudes are reckoned from the equator; and longitudes from the meridian of ſome remarkable place, as of London by the Britiſh, and of Paris by the French. But the aſtronomers of all nations agree in reckoning the latitudes of the moon, ſtars, planets, and comets, from the ecliptic; and their longitudes from the equinoctial colure, in that ſemicircle of it which cuts the ecliptic at the beginning of Aries; and thence eaſtward, quite round, to the ſame ſemicircle again. Conſequently thoſe ſtars which lie between the equinoctial and the northern half of the ecliptic, have north declination and ſouth latitude; thoſe which lie between the equinoctial and the ſouthern half of the ecliptic, have ſouth declination and north latitude; and all thoſe which lie between the tropics and poles, have their declination and latitudes of the ſame denomination.

There are ſix great circles on the celeſtial globe, which cut the ecliptic perpendicularly, and meet in two oppoſite points in the polar circles; which points are each ninety degrees from the ecliptic, and are called its poles. Theſe polar points divide thoſe circles into 12 ſemicircles; which cut the ecliptic at the beginnings of the twelve ſigns. They reſemble ſo many meridians on the terreſtrial globe: and as all places which lie under any particular meridian-ſemicircle on that globe have the ſame longitude; ſo all thoſe points of the heaven, through which any of the above ſemicircles are drawn, have the ſame longitude.—And as the greateſt latitudes on the earth are at the north and ſouth poles of the earth, ſo the greateſt latitudes in the heaven are at the north and ſouth poles of the ecliptic.

For the diviſion of the ſtars into conſtellations, &c. ſee ASTRONOMY, n° 403, 406.

PROB. I. *To find the right aſcenſion and declination of the ſun, or any fixed ſtar.*—Bring the ſun's place in the ecliptic to the braſen meridian: then that degree in the equinoctial which is cut by the meridian, is the ſun's *right aſcenſion;* and that degree of the meridian which is over the ſun's place, is his *declination.* Bring any fixed ſtar to the meridian, and its right aſcenſion will be cut by the meridian in the equinoctial; and the degree of the meridian that ſtands over it is its declination.

So that right aſcenſion and declination, on the celeſtial globe, are found in the ſame manner as longitude and latitude on the terreſtrial.

PROB. II. *To find the latitude and longitude of any ſtar.*—If the given ſtar be on the north ſide of the ecliptic, place the 90th degree of the quadrant of altitude on the north pole of the ecliptic, where the 12 ſemicircles meet, which divide the ecliptic into the 12 ſigns; but if the ſtar be on the ſouth ſide of the ecliptic, place the 90th degree of the quadrant on the ſouth pole of the ecliptic: keeping the 90th degree of the quadrant on the proper pole, turn the quadrant about, until its graduated edge cuts the ſtar: then the number of degrees in the quadrant, between the ecliptic and the ſtar, is its latitude; and the degree of the ecliptic, cut by the quadrant, is the ſtar's longitude, reckoned according to the ſign in which the quadrant then is.

PROB. III. *To repreſent the face of the ſtarry firmament, as ſeen from any given place of the earth, at any hour of the night.*—Rectify the celeſtial globe for the given latitude, the zenith and ſun's place in every reſpect, as taught by the XVIth problem for the terreſtrial; and turn it about, until the index points to the given hour: then the upper hemiſphere of the globe will repreſent the viſible half of heaven for that time; all the ſtars upon the globe being then in ſuch ſituations as entirely correſpond to thoſe in the heaven. And if the globe be placed duly north and ſouth, by means of a ſmall ſea compaſs, every ſtar in the globe will point towards the like ſtar in the heaven: by which means, the conſtellations and remarkable ſtars may be eaſily known. All thoſe ſtars which are in the eaſtern ſide of the horizon, are then riſing in the eaſtern ſide of the heaven; all in the weſtern, are ſetting in the weſtern ſide; and all thoſe under the upper part of the braſen meridian, between the ſouth point of the horizon and the north pole, are at their greateſt altitude, if the latitude of the place be north; but if the latitude be ſouth, thoſe ſtars which lie under the upper part of the meridian, between the north point of the horizon and the ſouth pole, are at their greateſt altitude.

PROB. IV. *The latitude of the place, and the day of the month, being given; to find the time when any known ſtar will riſe, or be upon the meridian, or ſet.*—Having rectified the globe, turn it about until the given ſtar comes to the eaſtern ſide of the horizon, and the index will ſhow the time of the ſtar's riſing; then turn the globe weſtward and when the ſtar comes to the braſen meridian, the index will ſhow the time of the ſtar's coming to the meridian of your place; laſtly, turn on, until the ſtar comes to the weſtern ſide of the horizon, and the index will ſhow the time of the ſtar's ſetting. *N. B.* In northern latitudes, thoſe ſtars which are leſs diſtant from the north pole than the quantity of its elevation above the north point of the horizon never ſet; and thoſe which are leſs diſtant from the ſouth pole than the number of degrees by which it is depreſſed below the horizon never riſe; and *vice verſa* in ſouthern latitudes.

PROB. V. *To find at what time of the year a given ſtar will open upon the meridian, at a given hour of the night.*—Bring the given ſtar to the upper ſemicircle of the braſs meridian, and ſet the index to the given hour; then turn the globe until the index points to XII at noon, and the upper ſemicircle of the meridian will then cut the ſun's place; anſwering to the day of the year ſought; which day may be eaſily found againſt the like place of the ſun among the ſigns on the wooden horizon.

PROB. VI. *The latitude, day of the month, and azimuth of any known ſtar being given; to find the hour of the night.*—Having rectified the globe for the latitude, zenith, and ſun's place, lay the quadrant of altitude to the given degree of azimuth in the horizon: then turn the globe on its axis, until the ſtar comes to the graduated edge of the quadrant; and when it does, the index will point out the hour of the night.

Prob. VII. *The latitude of the place, the day of the month, and altitude of any known ſtar, being given; to find the hour of night.*—Rectify the globe as in the former problem, gueſs at the hour of the night, and turn the globe until the index points at the ſuppoſed hour: then lay the graduated edge of the quadrant of altitude over the known ſtar; and if the degree of the ſtar's height in the quadrant upon the globe anſwers exactly to the degree of the ſtar's obſerved altitude in the heaven, you have gueſſed exactly: but if the ſtar on the globe is higher or lower than it was obſerved to be in the heaven, turn the globe backwards or forwards, keeping the edge of the quadrant upon the ſtar, until its centre comes to the obſerved altitude in the quadrant; and then the index will ſhow the true time of the night.

Prob. VIII. *An eaſy method for finding the hour of the night by any known ſtars, without knowing either their altitude or azimuth; and then of finding both their altitude and azimuth, and thereby the true meridian.*—Tie one end of a thread to a common muſket bullet; and having rectified the globe as above, hold the other end of the thread in your hand, and carry it ſlowly round betwixt your eye and the ſtarry heaven, until you find it cuts any two known ſtars at once. Then gueſſing at the hour of the night, turn the globe until the index points to that time in the hour circle; which done, lay the graduated edge of the quadrant over any one of theſe two ſtars on the globe which the thread cut in the heaven. If the ſaid edge of the quadrant cuts the other ſtar alſo, you have gueſſed the time exactly; but if it does not, turn the globe ſlowly backwards or forwards, until the quadrant (kept upon either ſtar) cuts them both through their centres: and then the index will point out the exact time of the night; the degree of the horizon, cut by the quadrant, will be the true azimuth of both theſe ſtars from the ſouth; and the ſtars themſelves will cut their true altitudes in the quadrant. At which moment, if a common azimuth-compaſs be ſet upon a floor or level pavement, that theſe ſtars in the heaven may have the ſame bearing upon it (allowing for the variation of the needle) as the quadrant of altitude has in the wooden horizon of the globe, a thread extended over the north and ſouth points of that compaſs will be directly in the plane of the meridian: and if a line be drawn upon the floor or pavement, along the courſe of the thread, and an upright wire be placed in the ſouthmoſt end of the line, the ſhadow of the wire will fall upon that line, when the ſun is on the meridian, and ſhines upon the pavement.

Prob. IX. *To find the place of the moon, or of any planet; and thereby to ſhow the time of its riſing, ſouthing, and ſetting.*—See in Parker's or Weaver's ephemeris the geocentric place of the moon or planet in the ecliptic, for the given day of the month; and according to its longitude and latitude, as ſhown by the ephemeris, mark the ſame with a chalk upon the globe. Then, having rectified the globe, turn it round its axis weſtward; and as the ſaid mark comes to the eaſtern ſide of the horizon, to the braſen meridian, and to the weſtern ſide of the horizon, the index will ſhow at what time the planet riſes, comes to the meridian, and ſets, in the ſame manner as it would do for a fixed ſtar.

For an explanation of the harveſt-moons by a globe, ſee Astronomy, n° 370.

For the equation of time, ſee Astronomy, n° 383.

4. *Deſcription of the Modern Improvements applied to Globes.*

81 Improvements on globes.

Globes mounted in the common manner, and with their hour circles fixed on the meridian, although inſtructive inſtruments for explaining the firſt principles of geography and the ſpherical doctrine of aſtronomy, yet contain ſeveral defects; as they prevent any elevation of the north and ſouth poles near to their axes, or the braſs meridian from being quite moveable round in the horizon. They do not ſhow how all the phenomena illuſtrated by them ariſe from the motion of the earth; a matter of conſequence to beginners: and they are only adapted to the preſent age; conſequently do not ſerve accurately the purpoſes of chronology and hiſtory, which they might be made to do if the poles whereon they turn were contrived to move in a circle round thoſe of the ecliptic, according to its preſent obliquity.

82 Mr Senex's contrivance.

The late Mr. John Senex F.R.S. invented a contrivance for remedying theſe defects, by fixing the poles of the diurnal motion to two ſhoulders or arms of braſs at the diſtance of 23½ deg. from the poles of the ecliptic. Theſe ſhoulders are ſtrongly faſtened at the other end to an axis, which paſſes through the poles of the ecliptic, and is made to move round with a very ſtiff motion; ſo that when it is adjuſted to any point of the ecliptic which the equator is made to interſect, the diurnal motion of the globe on its axis will not diſturb it. When it is to be adjuſted to any time, paſt or future, one of the braſen ſhoulders is brought under the meridian, and held faſt to it with one hand, whilſt the globe is turned about with the other; ſo that the point of the ecliptic which the equator is to interſect may paſs under the 0 degree of the brazen meridian; then holding a pencil to that point, and turning the globe about, it will deſcribe the equator according to its poſition at the time required; and transferring the pencil to 23½ and 66½ degrees on the braſen meridian, the tropics and polar circles will be ſo deſcribed for the ſame time. By this contrivance, the celeſtial globe may be ſo adjuſted, as to exhibit not only the riſing and ſetting of the ſtars in all ages and in all latitudes, but likewiſe the other phenomena that depend upon the motion of the diurnal axis round the annual axis. Senex's celeſtial globes, eſpecially the two greateſt, of 17 and 28 inches in diameter, have been conſtructed upon this principle; ſo that by means of a nut and ſcrew, the pole of the equator is made to revolve about the pole of the ecliptic. Phil. Tranſ. N° 447. p. 201, 203. or Martyn's Abr. Vol. VIII. p. 217. and N° 493, art. 18. in Phil. Tranſ. Vol. XLVI. p. 290.

83 Mr Martins addition to Mr Senex's

To repreſent the above phenomena in the moſt natural and eaſy manner, the late Mr B. Martin applied to Mr Senex's contrivance a moveable, equinoctial, and ſolſtitial colure; a moveable equinoctial circle, and a moveable ecliptic: all ſo connected together as to repreſent thoſe imaginary circles in the heavens for any age of the world.

84
Mr Harris's improvement.

Mr. Joſeph Harris, late eſſay-maſter of the mint, contrived to remedy the former of the defects abovementioned, by placing two horary circles under the meridian, one at each pole; theſe circles are fixed tight between two braſs rollers placed about the axis, ſo that when the globe is turned they are carried round with it, the meridian ſerving as an index to cut the horary diviſions. The globe in this ſtate ſerves univerſally and readily for ſolving problems in north and ſouth latitudes, and alſo in places near the equator; whereas in the common conſtruction, the axis and horary circle prevent the braſs meridian from being moveable quite round in the horizon. This globe is alſo adapted for ſhowing how the viciſſitudes of day and night, and the alteration of their length, are really occaſioned by the motion of the earth: for this purpoſe he divided the braſs meridian at one of the poles into months and days, according to the ſun's declination, reckoning from the pole. Therefore, by bringing the day of the month to the horizon, and rectifying the globe according to the time of the day, the horizon will repreſent the circle ſeparating light and darkneſs; and the upper half of the globe, the illuminated hemiſphere, the ſun being in the zenith. Phil. Tranſ. N° 456. p. 321. or Martyn's Abr. Vol. VIII. p. 252.

85
Mr Adam's additions.
Plate CCXI. fig. 1.

The late Mr. George Adam, mathematical inſtrument maker, has made ſome additional improvements in the conſtruction of the globes. His globes, like others, are ſuſpended at their poles in a ſtrong braſs circle MZÆS (ſee fig. 2. repreſenting the celeſtial), and turn therein upon two iron pins, which form the axis. They have each a thin braſs ſemicircle NHS moveable about theſe poles, with a ſmall, thin, ſliding, circle H thereon; which ſemicircle is divided into two quadrants of 90 degrees each, from the equator to both the poles. On the terreſtrial globe this ſemicircle is a moveable meridian, and its ſmall ſliding circle, which is divided into a few points of the compaſs, is the viſible horizon of any particular place to which it is ſet. On the celeſtial globe this ſemicircle is a moveable circle of declination, and its ſmall annexed circle an artificial ſun or planet. Each globe has a braſs wire TWY placed at the limits of the crepuſculum or twilight; which, together with the globe, is mounted in a wooden frame, ſupported by a neat pillar and claw-feet, with a magnetic needle in a compaſs-box marked M in the figure. On the ſtrong braſs circle of the terreſtrial globe, and about 23¼ degrees on each ſide of the north pole, the days of each month are laid down according to the ſun's declination; and this braſs circle is ſo contrived, that the globe may be placed with the north and ſouth poles in the plane of the horizon, and with the ſouth pole elevated above it. The equator on the ſurface of either globe ſerves the purpoſe of the horary circle, by means of a ſemicircular wire placed in the plane of the equator (ÆF), carrying two indices (F); one on the eaſt, the other on the weſt ſide of the ſtrong braſs circle; one of which is occaſionally to be uſed to point out the time upon the equator. In theſe globes, therefore, the indices being ſet to the particular time on the equator, the globes are turned round, and the indices point out the time by remaining fixed; whereas in the globes as generally mounted, the indices move over the horary circles while the globe is moving, and thus point out the change of time. For farther particulars of theſe globes, and the method of uſing them, Mr Adam's Treatiſe on their Conſtruction and Uſe, &c. 1772, may be conſulted.

The additions and alterations abovementioned, made by Mr Adam, may ſave trouble to a practitioner in the performance of a few complex problems, and render the globes more elegant and coſtly; but to a young beginner, the more ſimple the conſtruction of the globes, the better will they be adapted to initiate him into the rationale and practice of the problems in general; and as ſuch, the globes, as improved by the late Mr B. Martin and Mr Wright, deſcribed below, appear to have conſiderably the advantage in ſimplicity, and to obviate ſeveral material defects that attend the conſtruction of the other globes. The chief of the defects in the old globes is, that the horary circle being ſcrewed on the meridian at the north pole, prevents the elevation of the ſouth pole; which is neceſſary for the perforance of the problems for all latitudes. In Mr Adam's, the ſemicircular wire ÆF preventing the equator being placed exactly in the horizon, or the poles in the zenith, the great diſtance of the ſtrong braſs circle NZÆS from the ſurface of the globe, on account of the braſs ſemicircles, renders the ſolution of problems, which require the uſe of the ſtrong circle, not very eaſy nor accurate.

86
Mr Martin's improvement.

An eaſy and expeditious method of elevating the ſouth pole of the terreſtrial globe; and by which means the new diſcoveries, tracks, &c. made of late years by Captain Cook and other eminent navigators in the ſouth ſeas, may be clearly ſeen and traced by the eye over all the ſouthern ocean, was made uſe of by Mr B. Martin in the conſtruction of the following improvement.

There is a groove turned out on the back part of the braſs meridian A (fig. 2.); and by unſcrewing the nut of the hour circle D at the north pole, the circle is made to ſlide away to any other part of the meridian, as at G. The meridian is fixed or moveable at pleaſure by a ſcrew paſſing into the groove, though the piece or ſide of the notch in which it moves, on the bottom or nadir point: by properly looſening this ſcrew, the meridian is free to move, and the globe with it, into any required poſition; but at the ſame time, it is confined within the notch of the braſs-piece, and thereby the globe is prevented from falling out of the frame in any poſition thereof whatſoever. The hour-circle being removed, both the north and ſouth poles of the globe may be placed in the horizon, and thereby form a right ſphere, which the uſual mounting of the globes does not admit of.

Alſo by this conſtruction, the ſouth pole may be elevated for all latitudes: for this purpoſe there is an hour-circle about the ſouth pole between the meridian and the globe, which does not obſtruct the ſight of any land, none having been thereabouts diſcovered. Conſequently the globe is thus equally uſeful for the ſo-

ſolution of all common geographical problems in the ſouthern as in the northern hemiſphere, and more extenſively ſo than heretofore.

In this new method of mounting the globe, it may readily be converted into a *tellurian*; for as the globe cannot fall out of the frame, the horizon of the globe may be placed in a perpendicular poſition: then the ſun's place in the ecliptic being brought to the meridian, and its declination found, the pole of the globe muſt be elevated to that declination; which may be done by means of the degrees cut on the outer edge of the meridian for that purpoſe. If a lighted candle be placed at a conſiderable diſtance, exactly the height of the centre of the globe, and in a line with the meridian, the globe will exhibit all the phenomena of our earth for that day; for in this caſe the horizon of the globe becomes the ſolar horizon, and divides the whole into the enlightened and dark hemiſpheres: therefore upon turning the globe about its axis from weſt to eaſt, it will clearly appear that all places emerging out of the dark hemiſphere into the luminous one, under the weſtern part of the horizon, will ſee the ſun then as riſing; when they arrive at the meridian, it will be their noon; and when they deſcend into the dark hemiſphere at the eaſtern part of the horizon, they will ſee the ſun as ſetting.

When any place is under the meridian, ſet the hour-index to XII, and revolve the globe; then you will ſee the natural motion and poſition of that place at hours of the day; at what time the ſun riſes or ſets to it; the length of the diurnal and nocturnal arches, or of day and night; at which place the ſun does not riſe and ſet at that time; and from whence the viciſſitudes of the ſeaſons throughout the year in all latitudes, &c. &c.

To give this experiment the beſt effect, the candle ſhould be encloſed within a common dark lanthorn, and its light iſſue through a hole or lens made for that purpoſe.

On the outer part of the ſliding hour-circle, at the north pole, are uſually engraved the points of the compaſs; ſo that by bringing that circle centrally over any place on the globe, it will appear by inſpection only upon what point of the compaſs any other place bears from it, and that all over the globe.

87
Mr Wright's more ſimple improvement.

This method of the ſliding hour-circle is equally applicable to the celeſtial globe. Mr G. Wright of London has yet farther ſimplified the conſtruction of the hour-circles, and it is thereby rather leſs operoſe than Mr Martin's abovementioned. It conſiſts of the following particulars: There are engraved on the globes two hour-circles, one at each of the poles; which are divided into a double ſet of 12 hours, as uſual in the common braſs ones, except that the hours are figured round both to the right and left (ſee fig. 3.). The hour-hand or index (A) is placed in ſuch a manner under the braſs meridian, as to be moveable at pleaſure to any required part of the hour-circle, and yet remain there fixed during the revolution of the globe on its axis and is entirely independent of the poles of the globe. In this manner the motion of the globe round its axis, carrying the hour circle, the fixed index ſerves to point out the time, the ſame as in the reverſe way by Mr Martin's or other globes.

There is a ſmall advantage by having the hour-circle figured both ways, as one hour ſerves as a complement to XII. for the other, and the time of ſun riſing and ſetting, and *vice verſa*, may be both ſeen at the ſame time on the hour-circle. In the problems generally to be performed, the inner-circle is the circle of reckoning, and the outer one only the complement. Fig. 4. is a repreſentation of the globe, with Mr Wright's improved hour-circle at C.

Mr William Jones, mathematical inſtrument maker, Holborn, who mounts globes according to the improvements abovementioned of Meſſrs Martin and Wright, applies a compaſs of a portable ſize to the eaſt part of the wooden horizon circle of both globes (ſee F, fig. 2.), by a dove-tail ſlider on the lid of the compaſs-box; which method is found more convenient and ready in the performance of problems, than when fixed underneath the frame at the feet; and as it occaſionally ſlides away from the globes, the compaſs becomes uſeful in other ſituations.

88
Mr Smeaton's improvements.

In order to the performance of the problems which relate to the altitudes and azimuths of celeſtial objects, Mr Smeaton, F. R. S. has made ſome improvements applicable to the celeſtial globe; and to give ſome idea, of the conſtruction, they may be deſcribed as follows: Inſtead of a thin flexible ſlip of braſs, which generally accompanies the globes, called the *quadrant of altitude*, Mr Smeaton ſubſtitutes an arch of a circle of the ſame radius, breadth, and ſubſtance, as the braſs meridian, divided into degrees, &c. ſimilar to the diviſions of that circle, and which, on account of its ſtrength, is not liable to be bent out of the plane of a vertical circle, as uſual with the common quadrant put to globes. That end of this circular arch at which the diviſions begin, reſts on the horizon, being filed off ſquare to fit and reſt ſteadily on it throughout its whole breadth; and the upper end of the arch is firmly attached, by means of an arm, to a vertical ſocket, in ſuch a manner that when the lower end of the arch reſts on the horizon, the lower end of this ſocket ſhall reſt on the upper edge of the braſs meridian, directly over the zenith of the globe. This ſocket is fitted to and ground with a ſteel-ſpindle of the ſame length, ſo that it will turn freely on it without ſhaking; and the ſteel-ſpindle has an apparatus attached to its lower end, by which it can be faſtened in a vertical poſition to the braſs meridian, with its centre directly over the zenith point of the globe. The ſpindle being fixed firmly in this poſition, and the ſocket which is attached to the circular arch put on to it, and ſo adjuſted that the lower end of the arch juſt reſts on and fits cloſe to the horizon; it is evident that the altitude of any object above the horizon will be ſhown by the degree which it interſects on this arch, and its azimuth by that end of the arch which reſts on the horizon.

Beſides this improvement, Mr Smeaton directs to place the index which is uſually fixed on one end of the axis to point out the hour, in ſuch a manner that its upper ſurface may move in the plane of the hour-circle rather than above it, as it uſually does. He files off the end of this index to a circular arch, of the ſame radius with the inner edge of the hour-circle, to which it is to fit very exactly; and a fine line is drawn on its upper ſurface to determine the time by, inſtead of the tapering point which is gene-

Principles and Practice.

rally uſed. By theſe means half minutes may be diſtinguiſhed, if the hour circle be four inches in diameter. Mr Smeaton alſo deſcribes a contrivance for preventing the meridian from ſhifting after being rectified for the latitude of the place, and while the operator is engaged in adjuſting other parts of the apparatus. But as the purpoſe which this is intended to anſwer appears to be much better performed by the turned groove on the meridian in Mr Martin's contrivance deſcribed above, we ſhall omit the particular deſcription; and for farther explanations and figures of Mr Smeaton's improvements, refer the reader to the Phil. Tranſ. Vol. LXXIX, Part i.

For another improvement made to the celeſtial globe, by Mr Ferguſon, ſee Astronomy, n° 493, and fig. 187 of plate LXXXI.

Moſt of the above problems may alſo be performed by means of accurate maps; but this requires a great deal of calculation, which is often very troubleſome. The Analemma, or Orthographic Projection, delineated on Plate CCXII. will ſolve many of the moſt curious; and with the aſſiſtance of the maps will be almoſt equivalent to a terreſtrial globe. The parallel lines drawn on this figure repreſent the degrees of the ſun's declination from the equator, whether north or ſouth, amounting to 23½ nearly. On theſe lines are marked the months and days which correſpond to ſuch and ſuch declinations. The ſize of the figure does not admit of having every day of the year inſerted; but by making allowance for the intermediate days in proportion to the reſt, the declination may be gueſſed at with tolerable exactneſs. The elliptical lines are deſigned to ſhow the hours of ſun-riſing or ſun-ſetting before or after ſix o'clock. As 60 minutes make an hour of time, a fourth part of the ſpace between each of the hour-lines will repreſent 15 minutes; which the eye can readily gueſs at, and which is as great exactneſs as can be expected from any mechanical invention, or as is neceſſary to anſwer any common purpoſe. The circles drawn round the centre at the diſtance of 11¼ each, ſhow the point of the compaſs on which the ſun riſes and ſets, and on what point the twilight begins and ends.

In order to make uſe of this analemma, it is only neceſſary to conſider, that, when the latitude of the place and the ſun's declination are both north or both ſouth, the ſun riſes before ſix o'clock, between the eaſt and the elevated pole; that is, towards the north, if the latitude and declination are north; or towards the ſouth, if the latitude and declination are ſouth. Let us now ſuppoſe it is required to find the time of the ſun's riſing and ſetting, the length of the days and nights, the time when the twilight begins and ends, and what point of the horizon the ſun riſes and ſets on, for the Lizard point in England, Franckfort in Germany, or Abbeville in France, on the 30th of April. The latitude of theſe places by the maps will be found nearly 50° north. Place the moveable index ſo that its point may touch 50° on the quadrant of north latitude in the figure; then obſerve where its edge cuts the parallel line on which April 30th is wrote. From this reckon the hour-lines towards the centre, and you will find that the parallel-line is cut by the index nearly at the diſtance of one hour and 15 minutes. So the ſun riſes at one hour 15 minutes before ſix, or 45 minutes after four in the morning, and ſets 15 minutes after ſeven in the evening. The length of the day is 14 hours 30 minutes. Obſerve how far the interſection of the edge of the index with the parallel of April 30th is diſtant from any of the concentric circles; which you will find to be a little beyond that marked two points of the compaſs; and this ſhows, that on the 30th of April the ſun riſes two points and ſomewhat more from the eaſt towards the north, or a little to the northward of E. N. E. and ſets a little to the northward of W. N. W. To find the beginning and ending of twilight, take from the graduated arch of the circle 17½ degrees with a pair of compaſſes; move one foot of the compaſſes extended to this diſtance along the parallel for the 30th of April, till the other juſt touches the edge of the index, which muſt ſtill point at 50. The place where the other foot reſts on the parallel of April 30th, then denotes the number of hours before ſix at which the twilight begins. This is ſomewhat more than three hours and an half; which ſhows, that the twilight then begins ſoon after two in the morning, and likewiſe that it begins to appear near five points from the eaſt towards the north. The uſes of this analemma may be varied in a great number of ways; but the example juſt now given will be ſufficient for the ingenious reader.—The ſmall circles on the ſame plate, marked *Iſland*, *Promontory*, &c. are added in order to render the maps more intelligible, by ſhowing how the different ſubjects are commonly delineated on them.

Principles and Practice.

Having thus explained the uſe of the globes, and general principles of geography, we muſt refer to the Maps for the ſituation of each particular country, with regard to longitude, latitude, &c. and to the names of the countries as they occur in the order of the alphabet, for the moſt remarkable particulars concerning them.

GEOMANCY, Geomantia, a kind of divination, performed by means of a number of little points, or dots, made on paper at random: and conſidering the various lines and figures, which thoſe points preſent; and thence forming a pretended judgment of futurity, and deciding any queſtion propoſed.

The word is formed of the Greek γη, *terra*, "earth;" and μαντεια, "divination;" it being the ancient cuſtom to caſt little pebbles on the ground, and thence to form their conjectures; inſtead of the points afterwards made uſe of.

Polydore Virgil defines geomancy a kind of divination performed by means of clefts or chinks made in the ground; and takes the Perſian Magi to have been the inventors thereof.

GEOGRAPHY

Plate CCXI.

Fig. 4.

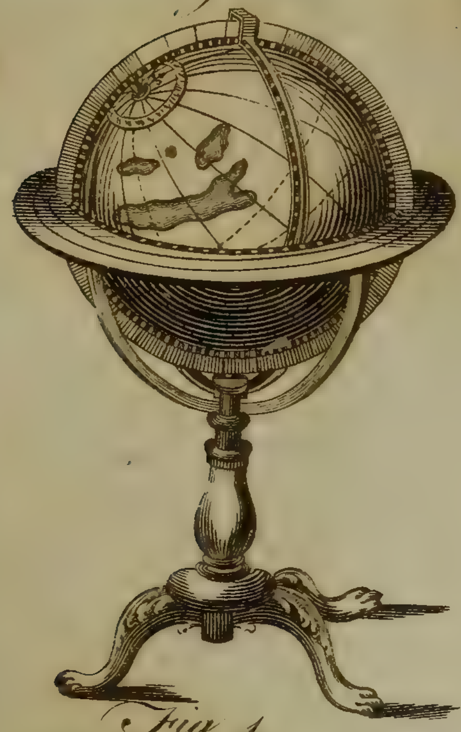


Fig. 3.

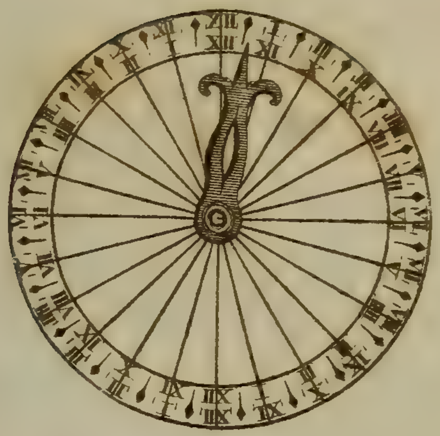


Fig. 1.

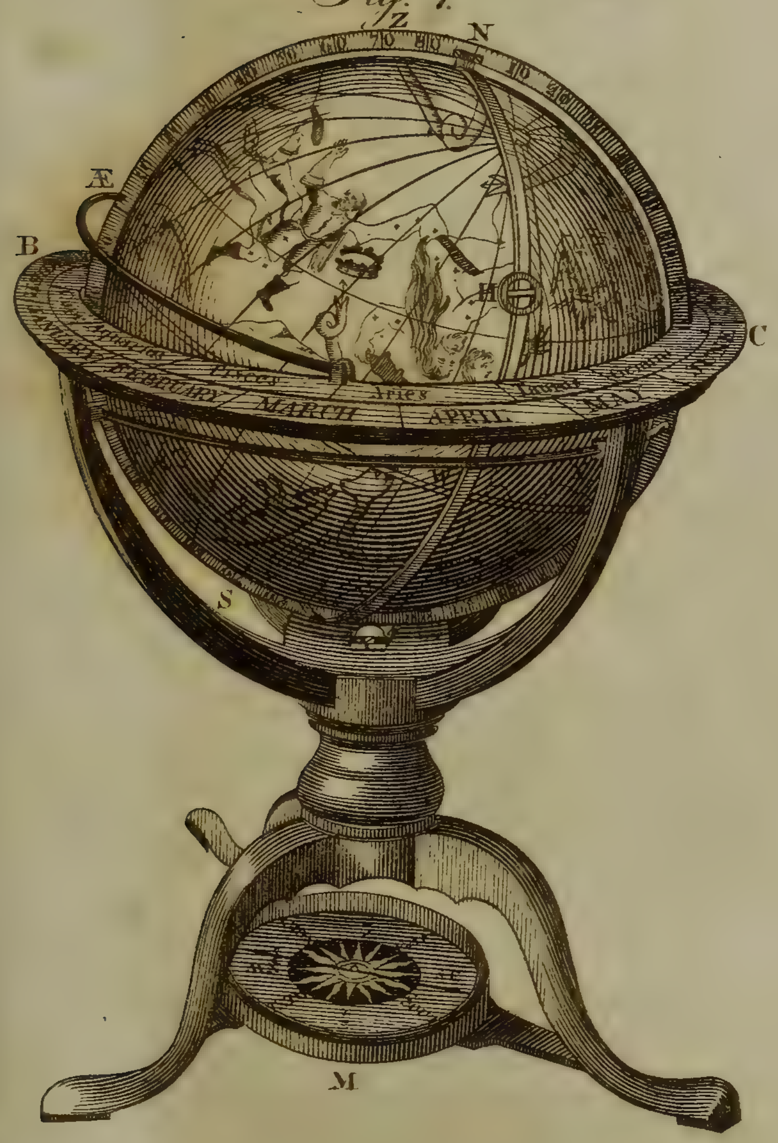
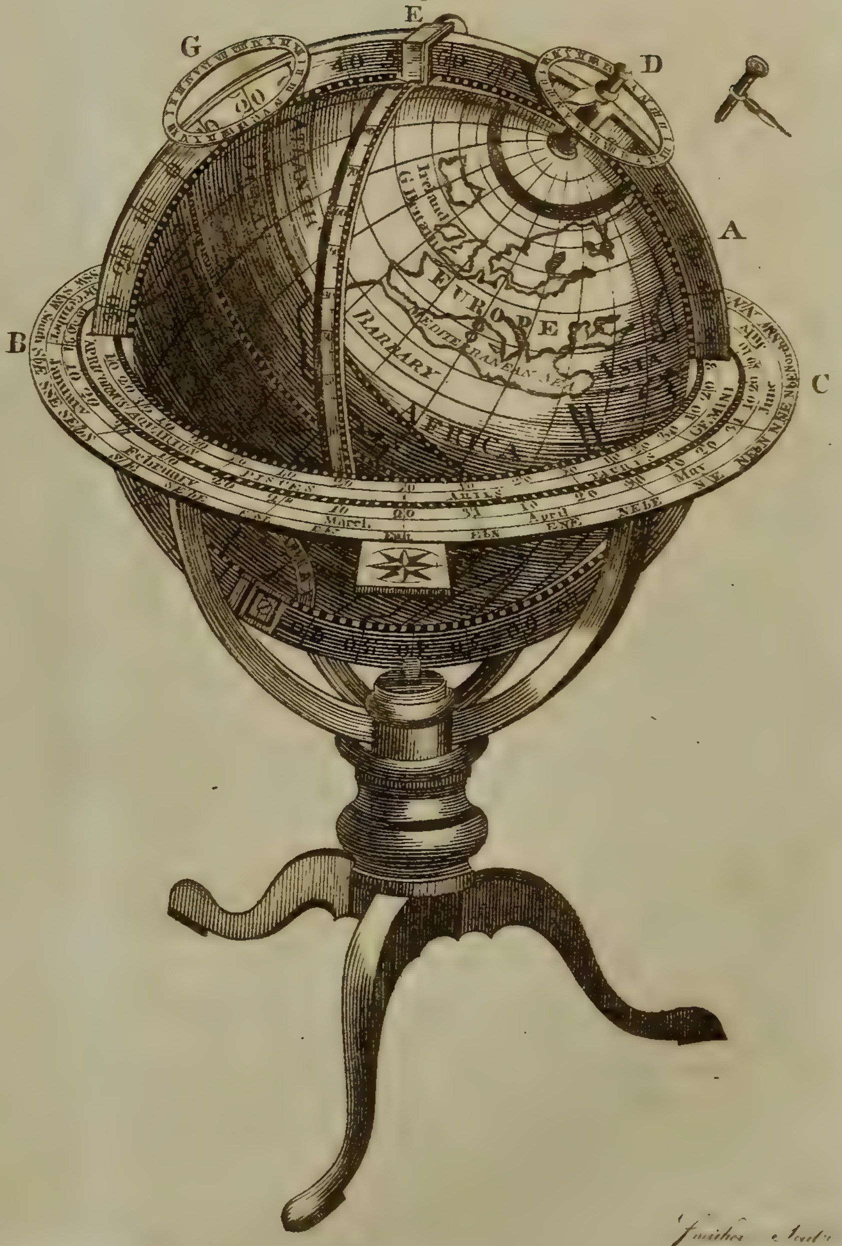


Fig. 2.



Smither Sculpt.

GEOMETRY

ORIGINALLY ſignified no more than the art of meaſuring the earth, or any diſtances or dimenſions within it: but at preſent it denotes the ſcience of magnitude in general; comprehending the doctrine and relations of whatever is ſuſceptible of augmentation or diminution, conſidered in that light.

Hence to geometry may be referred the conſideration not only of lines, ſurfaces, and ſolids; but alſo of time, velocity, number, weight, &c.

This ſcience had its riſe among the Egyptians, who were in a manner compelled to invent it, to remedy the confuſion which generally happened in their lands, from the inundations of the river Nile, which carried away all boundaries, and effaced all the limits of their poſſeſſions. Thus this invention, which at firſt conſiſted only in meaſuring the lands, that every perſon might have what belonged to him, was called *geometry*, or the art of meaſuring land; and it is probable that the draughts and ſchemes, which they were annually compelled to make, helped them to diſcover many excellent properties of theſe figures; which ſpeculations continued to be gradually improved, and are ſo to this day.

From Egypt geometry paſſed into Greece; where it continued to receive new improvements in the hands of Thales, Pythagoras, Archimedes, Euclid, &c. The Elements of Geometry, written by this laſt in 15 books, are a moſt convincing proof to what perfection this ſcience was carried among the ancients. However, it muſt be acknowledged, that it fell ſhort of modern geometry; the bounds of which, what by the invention of fluxions, and the diſcovery of the almoſt infinite orders of curves, are greatly enlarged.

We may diſtinguiſh the progreſs of geometry into three ages; the firſt of which was in its meridian glory at the time when Euclid's Elements appeared; the ſecond, beginning with Archimedes, reaches to the time of Des Cartes, who, by applying algebra to the elements of geometry, gave a new turn to this ſcience, which has been carried to its utmoſt perfection by Sir Iſaac Newton and Mr Leibnitz.

In treating this uſeful ſubject, we ſhall divide it into two parts; the firſt containing the general principles; and the ſecond, the application of theſe principles to the menſuration of ſurfaces, ſolids, &c.

PART I. GENERAL PRINCIPLES OF GEOMETRY.

Plate CCXV.

Art. 1. A POINT is that which is not made up of parts, or which is of itſelf indiviſible.

2. A line is a length without breadth, as A——— B.

3. The extremities of a line are points; as the extremities of the line AB, are the points A and B, fig. 1.

4. If the line AB be the neareſt diſtance between its extremes A and B, then it is called a *ſtraight line*, as AB; but if it be not the neareſt diſtance, then it is called a *curve line*, as *a b*, fig. 1.

5. A ſurface is that which is conſidered as having only length and breadth, but no thickneſs, as fig. 2.

6. The terms or boundaries of a ſurface are lines.

7. A plain ſurface is that which lies even between its extremes.

8. The inclination between two lines meeting one another (provided they do not make one continued line), or the opening between them, is called an *angle*; thus the inclination of the line AB to the line CB (fig. 3.) meeting one another at B, or the opening between the two lines AB and CB, is called an *angle*.

9. When the lines forming the angle are right lines, then it is called a *right-lined angle*, as fig. 4.; if one of them be right and the other curved, it is called a *mixed angle*, as fig. 5.; if both of them be curved, it is called a *curve-lined angle*, as fig. 6.

10. If a right line AB fall upon another DC, (fig. 7.) ſo as to incline neither to one ſide nor to the other, but make the angles ABD, ABC, on each ſide equal to one another; then the line AB is ſaid to be *perpendicular* to the line DC, and the two angles are called *right-angles*.

11. An obtuſe angle is that which is greater than a right one, as fig. 8.; and an acute angle, that which is leſs than a right one, as fig. 9.

12. If a right line DC be faſtened at one of its ends C, and the other end D be carried quite round, then the ſpace comprehended is called a *circle*; the curve line deſcribed by the point D, is called the *periphery* or *circumference* of the circle; the fixed point C is called the *centre* of it; fig. 10.

13. The deſcribing line CD is called the *radius*, viz. any line drawn from the centre to the circumference; whence all radii of the ſame or equal circles are equal.

14. Any line drawn through the centre, and terminated both ways by the circumference, is called a *diameter*, as BD is a diameter of the circle BADE. And the diameter divides the circle and circumference into two equal parts, and is double the radius.

15. The circumference of every circle is ſuppoſed to be divided into 360 equal parts, called *degrees*; and each degree is divided into 60 equal parts, called *minutes*; and each minute in 60 equal parts, called *ſeconds*; and theſe into *thirds*, *fourths*, &c. theſe parts being greater or leſs according as the radius is.

16. Any part of the circumference is called an *arch*, or *arc*; and is called an arc of as many degrees as it contains parts of the 360, into which the circumference was divided: thus if AD be the $\frac{1}{8}$ of the circumference, then the arc AD is an arc of 45 degrees.

17. A line drawn from one end of an arc to the other, is called a *chord*, and is the meaſure of the arc: thus the right line AB is the chord of the arch ADB, fig. 11.

18. Any

General Principles.

18. Any part of a circle cut off by a chord, is called a *ſegment*; thus the ſpace comprehended between the chord AB and the circumference ADB (which is cut off by the chord AB) is called a *ſegment*. Whence it is plain,

1ſt, That all chords divide the circle into two ſegments.

2ndly. The leſs the chord is, the more unequal are the ſegments, and *e contra*.

3dly, When the chord is greateſt, viz. when it is a diameter, then the ſegments are equal, viz. each a ſemicircle.

19. Any part of a circle (leſs than a ſemicircle) contained between two radii and an arc, is called a *ſector*; thus the ſpace contained between the two radii, AC, BC, and the arc AB, is called a *ſector*, fig. 12.

20. The right ſine of any arc, is a line drawn perpendicular from one end of the arc, to a diameter drawn through the other end of the ſame arc; thus (fig. 13.) AD is the right ſine of the arc AB, it being a line drawn from A, the one end of the arc AB, perpendicular to CB, a diameter paſſing through B, the other end of the arc AB.

Now the ſines ſtanding on the ſame diameter, ſtill increaſe till they come to the centre, and then becoming the radius, it is plain that the radius EC is the greateſt poſſible ſine, and for that reaſon it is called the *whole ſine*.

Since the whole ſine EC muſt be perpendicular to the diameter FB (by def. 20.), therefore producing the diameter EG, the two diameters FB, EG, muſt croſs one another at right angles, and ſo the circumference of the circle muſt be divided by them into four parts, EB, BG, GF, and FE, and theſe four parts are equal to one another (by def. 10.) and ſo EB a quadrant, or fourth part of the circumference; therefore the radius EC is always the ſine of the quadrant, or fourth part of the circle EB.

Sines are ſaid to be of ſo many degrees, as the arc contains parts of the 360, into which the circumference is ſuppoſed to be divided: ſo the radius being the ſine of a quadrant, or fourth part of the circumference, which contains 90 degrees (the fourth part of 360), therefore the radius muſt be the ſine of 90 degrees.

21. The part of the radius comprehended between the extremity of the right ſine and the lower end of the arc, viz. DB, is called the verſed ſine of the arc AB.

22. If to any point in the circumference, viz. B, there be drawn a diameter FCB, and from the point B, perpendicular to that diameter, there be drawn the line BH; that line is called a *tangent* to the circle in the point B; which tangent can touch the circle only in one point B, elſe if it touched it in more, it would go within it, and ſo not be a tangent but a chord, (by art. 17.)

23. The tangent of any arc AB, is a right line drawn perpendicular to a diameter through the one end of the arc B, and terminated by a line CAH, drawn from the centre through the other end A; thus BH is the tangent of the arc AB.

24. And the line which terminates the tangent, viz. CH, is called the ſecant of the arc AB.

25. What an arc wants of a quadrant is called the *complement* of that arc; thus AE, being what the arc AB wants of the quadrant EB, is called the complement of the arc AB.

26. And what an arc wants of a ſemicircle is called the *ſupplemnet* of that arc: thus ſince AF is what the arc AB wants of the ſemicircle BAF, it is the ſupplement of the arc AB.

27. The ſine, tangent, &c. of the complement of any arc, is called the *co-ſine*, *co-tangent*, &c. of that arc; thus the ſine, tangent, &c. of the arc AE, is called the co-ſine, co-tangent, &c. of the arc AB.

28. The ſine of the ſupplement of an arc is the ſame with the ſine of the arc itſelf; for drawing them according to the definition, there reſults the ſelf-ſame line.

29. A right-lined angle is meaſured by an arc of a circle deſcribed upon the angular point as a centre, comprehended between the two legs that form the angle; thus (fig. 14.) the angle ABD is meaſured by the arc AD of the circle CADE that is deſcribed upon the point B as a centre; and the angle is ſaid to be of as many degrees as the arc is; ſo if the arc AD be 45 degrees, then the angle ABD is ſaid to be an angle of 45 degrees.

Hence the angles are greater or leſs, according as the arc deſcribed about the angular point, and terminated by the two legs, contain a greater or a leſs number of degrees.

30. When one line falls perpendicularly to another, as AB on CD, fig. 15. then the angles are right (by the 10 def.); and deſcribing a circle on the centre B, ſince the angles ABC ABD are equal, their meaſures muſt be ſo too, *i. e*, the arcs AC AD muſt be equal; but the whole CAD is a ſemicircle, ſince CD, a line paſſing through the centre B, is a diameter; therefore each of the parts AC AD is a quadrant, *i. e*, 90 degrees; ſo the meaſure of a right angle is always 90 degrees.

31. If one line AB fall any way upon another, CD, then the ſum of the two angles ABC ABD is always equal to the ſum of two right angles; fig. 16. For on the point C, deſcribing the circle CAD, it is plain, that CAD is a ſemicircle (by the 14th); but CAD is equal to CA and AD the meaſure of the two angles; therefore the ſum of the two angles is equal to a ſemicircle, that is, to two right angles, (by the laſt).

Cor. 1. From whence it is plain, that all the angles which can be made from a point in any line, towards one ſide of the line, are equal to two right angles.

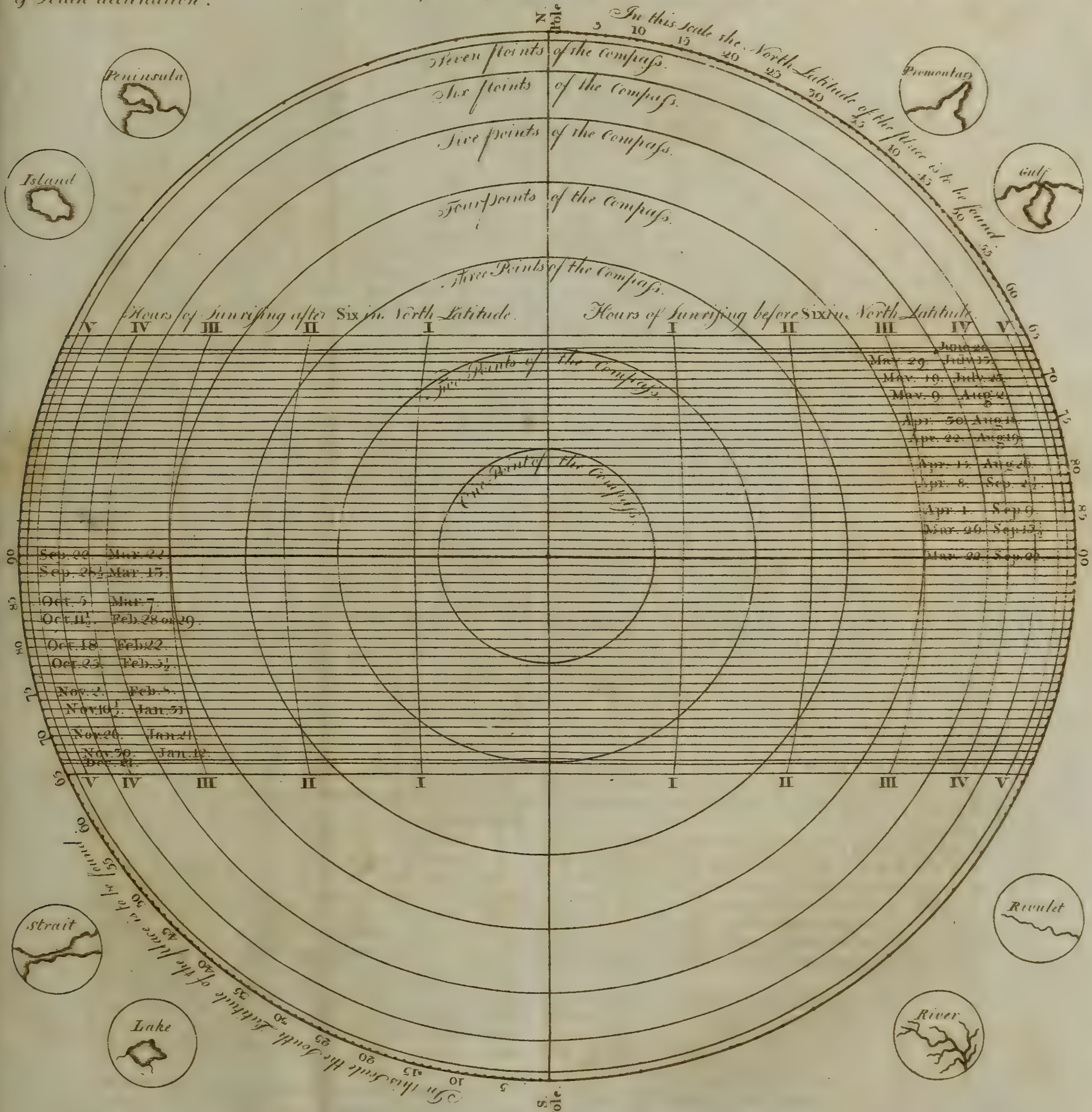
2. And that all the angles which can be made about a point, are equal to four right ones.

32. If one line AC croſs another BD in the point E, then the oppoſite angles are equal, viz. BEA to CED, and BEC equal to AED; fig. 17. For upon the point E, as a centre, deſcribing the circle ABCD, it is plain ABC is a ſemicircle, as alſo BCD (by the 14th); therefore the arc ABC is equal to the arc BCE; and from both taking the common arc BC, there will remain AB equal to CD, *i. e.* the angle BEA equal to the angle CED (by art. 29.) After the ſame manner we may prove, that the angle BEC is equal to the angle AED.

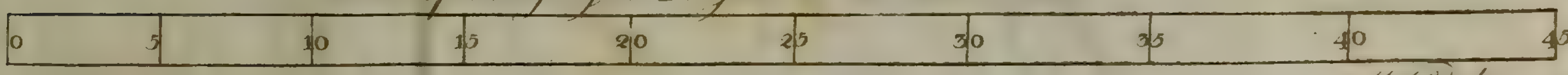
33. Lines which are equally diſtant from one another, are called *parallel lines*; as AB, CD, fig. 18.

34. If

AN ANALEMMA. *Shewing the time of Sunrising & Sun setting, the length of the Days & Nights, and the point of the Compass on which the Sun rises & sets, for every Degree of Latitude, and for every Degree of the Suns North & South declination.*

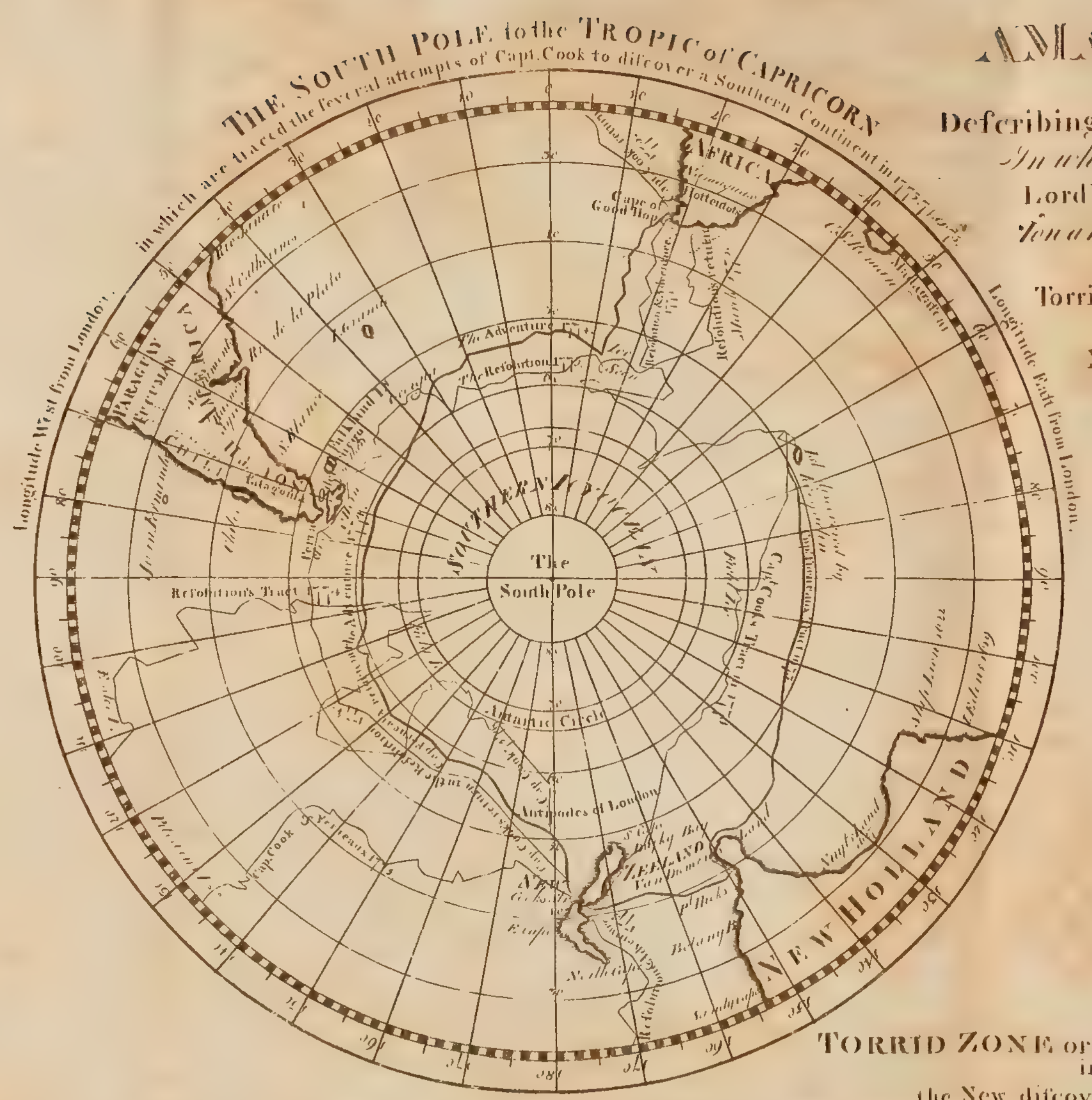


Method of enlarging the Degrees in Mercator's Chart

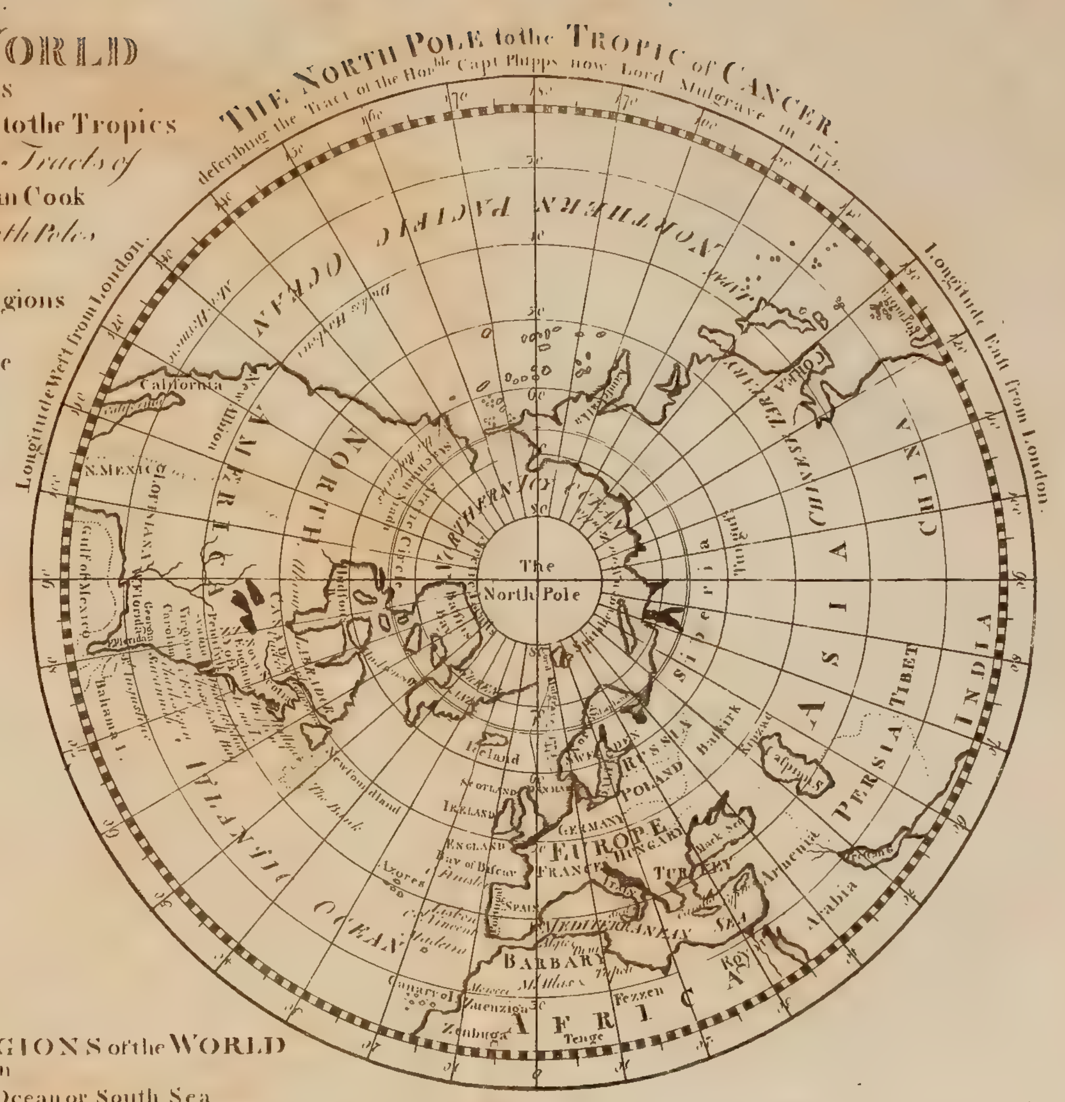


H. Barker, sculp.

A MAP of the WORLD
in three Sections
Deſcribing the Polar Regions to the Tropics
In which are traced the Tracts of
Lord Mulgrave and Captain Cook
Towards the North & South Poles
and the
Torrid Zone or Tropical Regions
with the
New Diſcoveries in the
SOUTH SEA

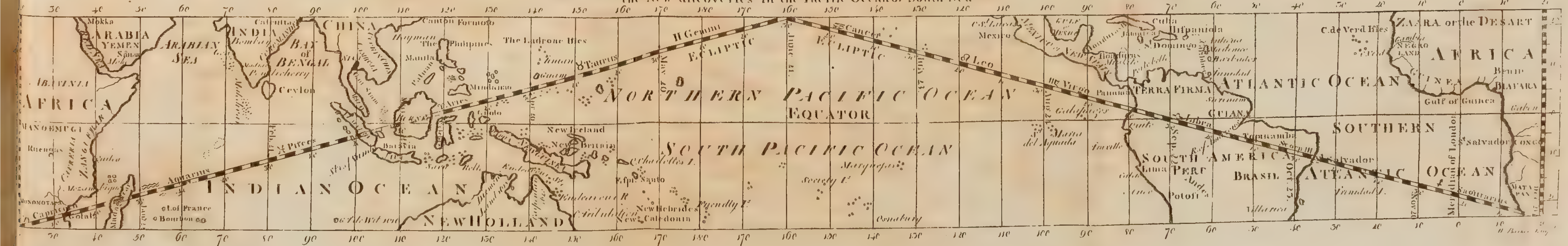


THE SOUTH POLE to the TROPIC of CAPRICORN
in which are traced the ſeveral attempts of Capt. Cook to diſcover a Southern Continent in 1773, 1774 & 1775.



THE NORTH POLE to the TROPIC of CANCER.
deſcribing the Tract of the Honble Capt Phipps now Lord Mulgrave in 1773.

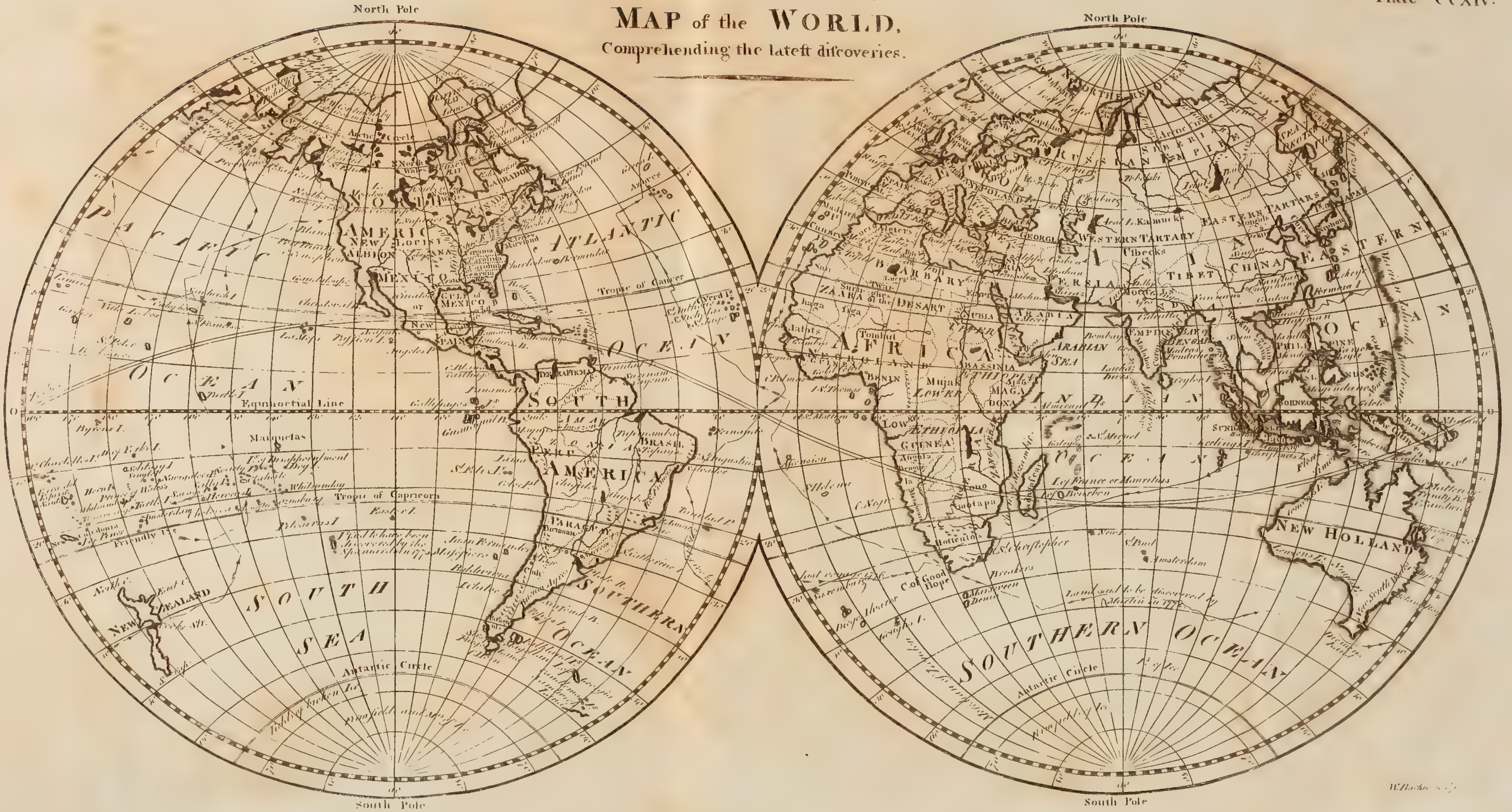
TORRID ZONE or TROPICAL REGIONS of the WORLD
in which are laid down
the New diſcoveries in the Pacific Ocean or South Sea



GEOGRAPHY.

MAP of the WORLD,

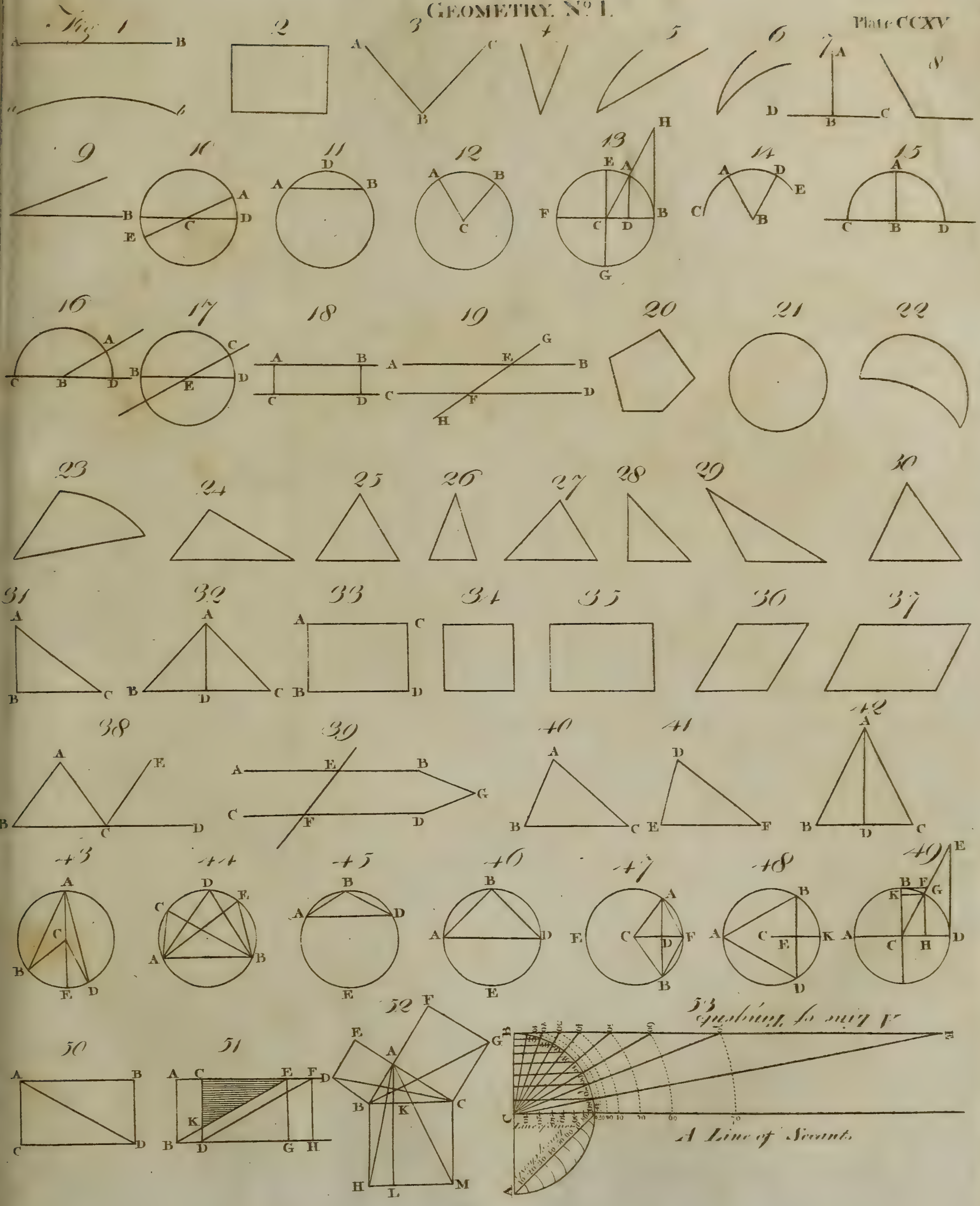
Comprehending the lateſt diſcoveries.



W. Barker sculp.

GEOMETRY. No. I.

Plate CCXV



34. If a line GH croſs two parallels AB, CD, (fig. 19.) then the external oppoſite angles are equal, viz. GEB equal to CFH, and AEG equal to HFD. For ſince AB and CD are parallel to one another, they may be conſidered as one broad line, and GH croſſing it; then the vertical or oppoſite angles GEB CFH are equal (by art. 32.), as alſo AEG and HFD by the ſame.

35. If a line GH croſs two parallels AB, CD, then the alternate angles, viz. AEF and EFD, or CFE and FEB, are equal; that is, the angle AEF is equal to the angle EFD, and the angle CFE is equal to the angle FEB, for GEB is equal to AEF (by art. 32.), and CFH is equal to EFD (by the ſame); but GEB is equal to CFH (by the laſt); therefore AEF is equal to EFD. The ſame way we may prove FEB equal to EFC.

36. If a line GH croſs two parallel lines AB, CD, then the external angle GEB is equal to the internal oppoſite one EFD, or GEA equal to CFE. For the angle AEF is equal to the angle EFD (by the laſt); but AEF is equal to GEB (by art. 32.), therefore GEB is equal to EFD. The ſame way we may prove AEG equal to CFE.

37. If a line GH croſs two parallel lines AB, CD, then the ſum of the two internal angles, *viz.* BEF and DFE, or AEF and CFE, are equal to two right angles; for ſince the angle GEB is equal to the angle EFD (by art 36.), to both add the angle FEB, then GEB and BEF are equal to BEF and DFE; but GEB and BEF are equal to two right angles (by art. 31.), therefore BEF and DFE are alſo equal to two right angles. The ſame way we may prove that AEF and CFE are equal to two right angles.

38. A figure is any part of ſpace bounded by lines or a line. If the bounding lines be ſtraight, it is called a *rectilineal figure*, as fig. 20. if they be curved, it is called a *curvilineal figure*, as fig. 21. and fig. 22.; if they be partly curve lines and partly ſtraight, it is called a *mixt figure*, as fig. 23.

39. The moſt ſimple rectilinear figure is that which is bounded by three right lines, and is called a *triangle*, as fig. 24.

40. Triangles are divided into different kinds, both with reſpect to their ſides and angles: with reſpect to their ſides, they are commonly divided into three kinds, *viz.*

41. A triangle having all its three ſides equal to one another, is called an *equilateral triangle*, as fig. 25.

42. A triangle having two of its ſides equal to one another, and the third ſide not equal to either of them, is called an *Iſoſceles triangle*, as fig. 26.

43. A triangle having none of its ſides equal to one another, is called a *ſcalene triangle*, as fig. 27.

44. Triangles, with reſpect to their angles, are divided into three different kinds, *viz.*

45. A triangle having one of its angles right, is called a *right-angled triangle*, as fig. 28.

46. A triangle having one of its angles obtuſe, or greater than a right angle, is called an *obtuſe-angled triangle*, as fig. 29.

47. Laſtly, a triangle having all its angles acute, is called an *acute-angled triangle*, as fig. 30.

48. In all right-angled triangles, the ſides comprehending the right angle are called the *legs*, and the ſide oppoſite to the right angle is called the *hypothenuſe*. Thus in the right-angled triangle ABC, fig. 31. (the right angle being at B), the two ſides AB and BC, which comprehend the right angle ABC, are the legs of the triangle; and the ſide AC, which is oppoſite to the right angle ABC, is the hypothenuſe of the right-angled triangle ABC.

49. Both obtuſe and acute angled triangles are in general called *oblique-angled triangles*; in all which any ſide is called the *baſe*, and the other two the *ſides*.

50. The perpendicular height of any triangle is a line drawn from the vertex to the baſe perpendicularly; thus if the triangle ABC (fig. 32.) be propoſed, and BC be made its baſe, then A will be the vertex, viz. the angle oppoſite to the baſe; and if from A you draw the line AD perpendicular to BC, then the line AD is the height of the triangle ABC ſtanding on BC as its baſe.

Hence all triangles ſtanding between the ſame parallels have the ſame height, ſince all the perpendiculars are equal by the nature of the parallels.

51. A figure bounded by four ſides is called a *quadrilateral* or *quadrangular figure*, as ABCD, fig. 33.

52. Quadrilateral figures, whoſe oppoſite ſides are parallel, are called *parallelograms*. Thus in the quadrilateral figure ABDC, if the ſide AC be parallel to the ſide BD which is oppoſite to it, and AB be parallel to CD, then the figure ABDC is called a *parallelogram*.

53. A parallelogram having all its ſides equal and angles right, is called a *ſquare*, as fig. 34.

54. That which hath only the oppoſite ſides equal and its angles right, is called a *rectangle*, as fig. 35.

55. That which hath equal ſides, but oblique angles, is called a *rhombus*, as fig. 36. and is juſt an inclined ſquare.

56. That which hath only the oppoſite ſides equal and the angles oblique, is called a *rhomboides*, as fig. 37. and may be conceived as an inclined rectangle.

57. When none of the ſides are parallel to another, then the quadrilateral figure is called a *trapezium*.

58. Every other right-lined figure, that has more ſides than four, is in general called a *polygon*. And figures are called by particular names according to the number of their ſides, *viz.* one of five ſides is called a *pentagon*, of ſix a *hexagon*, of ſeven a *heptagon*, and ſo on. When the ſides forming the polygon are equal to one another, the figure is called a regular figure or polygon.

59. *In any triangle* ABC (fig. 38.) *on of its ſides, as* BC, *being produced towards* D, *the external angle* ACD *is equal to both the internal oppoſite ones taken together, viz. to* ABC *and* BAC. In order to prove this, thro' C, draw CE parallel to AB; then ſince CE is parallel to AB, and the lines AC and BD croſs them, the angle ECD is equal to ABC (by art. 36.) and the angle ACE equal to CAB (by art. 35.); therefore the angles ECD and ECA are equal to the angles ABC and CAB; but the angles ECD and ECA are together equal to the angle ACD; therefore the angle ACD is equal to both the angles ABC and CAB taken together.

Cor. Hence it may be proved, that if two lines AB and CD (fig. 39.) be croſſed by a third line EF, and the alternate angles AEF and EFD be equal, the lines AB and CD will be parallel; for if they are not parallel, they muſt meet one another on one ſide of the line EF (ſuppoſe at G), and ſo form the triangle EFG, one of whoſe ſides GE being produced at A, the exterior angle AEF muſt (by this article) be equal to the ſum of the two angles EFG and EGF; but, by ſuppoſition, it is equal to the angles EFG alone; therefore the angle AEF muſt be equal to the ſum of the two angles EFG and EGF, and at the ſame time equal to the angle EFG alone, which is abſurd; ſo the lines AB and CD cannot meet, and therefore muſt be parallel.

60. *In any triangle* ABC, *all the three angles taken together are equal to two right angles.* To prove this, you muſt produce BC, one of its ſides, to any diſtance, ſuppoſe to D; then by the laſt propoſition, the external angle, ACD, is equal to the ſum of the two internal oppoſite ones CAB and ABC; to both add the angle ACB, then the ſum of the angles ACD and ACB will be equal to the ſum of the angles CAB and CBA and ACB. But the ſum of the angles ACD and ACB, is equal to two right ones (by art. 32.), therefore the ſum of the three angles CAB and CBA and ACB, is equal to two right angles; that is, the ſum of the three angles of any triangle ACB is equal to two right angles.

Cor. 1. Hence in any triangle given, if one of its angles be known, the ſum of the other two is alſo known: for ſince (by the laſt) the ſum of all the three is equal to two right angles, or a ſemicircle, it is plain, that taking any one of them from a ſemicircle or 180 degrees, the remainder will be the ſum of the other two. Thus (in the former triangle ABC) if the angle ABC be 40 degrees, by taking 40 from 180 we have 140 degrees; which is the ſum of the two angles BAC, ACB: the converſe of this is alſo plain, *viz.* the ſum of any two angles of a triangle being given, the other angle is alſo known by taking that ſum from 180 degrees.

2. In any right-angled triangle, the two acute angles muſt juſt make up a right one between them; conſequently, any one of the oblique angles being given, we may find the other by ſubtracting the given one from 90 degrees, which is the ſum of both.

61. If in any two triangles, ABC (fig. 40.) DEF (fig. 41.) two ſides of the one, *viz.* AB and AC, be equal to two ſides of the other, *viz.* to DE and DF, each to each reſpectively, *i. e.* AB to DE and AC to DF; and if the angles included between the equal ſides be equal, *viz.* the angle BAC equal to the angle EDF; then the remaining ſide of the one ſhall be equal to the remaining ſide of the other, *viz.* BC to EF; and the angles oppoſite to equal ſides ſhall be equal, *viz.* ABC equal to DEF (being oppoſite to the equal ſides AC and DF), alſo ACB equal to DFE (which are oppoſite to the equal ſides AB and DE). For if the triangle ABC be ſuppoſed to be lifted up and put upon the triangle DEF, and the point A on the point D; it is plain, ſince BA and DE are of equal length, the point B will fall upon the point E; and ſince the angles BAC EDF are equal, the line AC will fall upon the line DF; and they being of equal length, the point C will fall upon the point F; and ſo the line BC will exactly agree with the line EF, and the triangle ABC will in all reſpects be exactly equal to the triangle DEF; and the angle ABC will be equal to the angle DEF, alſo the angle ACB will be equal to the angle DFE.

Cor. 1. After the ſame manner it may be proved, that if in any two triangles ABC, DEF (ſee the preceding figure), two angles ABC and ACB of the one, be equal to two angles DEF and DFE of the other, each to each reſpectively, *viz.* the angle ABC to the angle DEF, and the angle ACB equal to the angle DFE, and the ſides included between theſe angles be alſo equal, *viz.* BC equal to EF, then the remaining angles, and the ſides oppoſite to the equal angles, will alſo be equal each to each reſpectively; *viz.* the angle BAC equal to the angle EDF, the ſide AB equal to DE, and AC equal to DF: for if the triangle ABC be ſuppoſed to be lifted up and laid upon the triangle DEF, the point B being put upon the point E, and the line BC upon the line EF, ſince BC and EF are of equal lengths, the point C will fall upon the point F, and ſince the angle ACB is equal to the angle DFE, the line CA will fall upon the line FD, and by the ſame way of reaſoning the line BA will fall upon the line ED; and therefore the point of interſection of the two lines BA and CA, *viz.* A, will fall upon the point of interſection of the two lines ED and FD, *viz.* D, and conſequently BA will be equal to ED, and AC equal to DF, and the angle BAC equal to the angle EDF.

Cor. 2. It follows likewiſe from this article, that if any triangle ABC (fig. 42.) has two of its ſides AB and AC equal to one another, the angles oppoſite to theſe ſides will alſo be equal, *viz.* the angles ABC equal to the angle ACB. For ſuppoſe the line AD biſecting the angle BAC, or dividing it into two equal angles BAD and CAD, and meeting BC in D, then the line AD will divide the whole triangle BAC into two triangles ABD and DAC; in which BA and AD two ſides of the one, are equal to CA and AD two ſides of the other, each to each reſpectively, and the included angles BAD and DAC are by ſuppoſition equal; therefore (by this article) the angle ABC muſt be equal to the angle ACB.

62. *Any angle, as* BAD (fig. 43.) *at the circumference of a circle* BADE, *is but half the angle* BCD *at the centre ſtanding on the ſame arch* BED. To demonſtrate this, draw through A and the centre C the right-line ACE, then the angle ECD is equal to both the angles DAC and ADC (by art. 59.); but ſince AC and CD are equal (being two radii of the ſame circle), the angles ſubtended by them muſt be equal alſo (by *art.* 62. *cor.* 2.), *i. e*, the angle CAD equal to the angle CDA; therefore the ſum of them is double any one of them, *i. e.* DAC and ADC is double of CAD, and therefore ECD is alſo double of DAC: the ſame way it may be proved, that ECB is double of CAB; and therefore the angle BCD is double of the angle BAD, or BAD the half of BCD, which was to be proved.

Cor. 1. Hence an angle at the circumference is meaſured by half the arc it ſubtends; for the angle at the centre (ſtanding on the ſame arc) is meaſured by the whole arc (by art. 29.); but ſince the angle at the centre is double that at the circumference, it is plain the angle at the circumference muſt be meaſured by only half the arc it ſtands upon.

Cor. 2. Hence all angles, ACB, ADB, AEB, &c. (fig. 44.) at the circumference of a circle, ſtanding on the ſame chord AB, are equal to one another; for by the laſt corollary they are all meaſured by the ſame arc, *viz.* half the arc AB which each of them ſubtends.

Cor. 3. Hence an angle in a ſegment greater than a ſemicircle is leſs than a right angle: thus, if ADB be a ſegment greater than a ſemicircle (ſee the laſt figure), then the arc AB, on which it ſtands, muſt be leſs than a ſemicircle, and the half of it leſs than a quadrant or a right angle; but the angle ADB in the ſegment is meaſured by the half of AB, therefore it is leſs than a right angle.

Cor. 4. An angle in a ſemicircle is a right angle. For ſince ABD (fig. 46.) is a ſemicircle, the arc AED muſt alſo be a ſemicircle: but the angle ABD is meaſured by half the arc AED, that is, by half a ſemicircle or quadrant; therefore the angle ABD is a right one.

Cor. 5. Hence an angle in a ſegment leſs than a ſemicircle, as ABD (fig. 45.), is greater than a right angle: for ſince the arc ABD is leſs than a ſemicircle, the arc AED muſt be greater than a ſmicircle, and ſo its half greater than a quadrant, *i. e.* than the meaſure of a right angle; therefore the angle ABD, which is meaſured by half the arc AED, is greater than a right angle.

63. *If from the centre* C *of the circle* ABE (fig. 47.) *there be let fall the perpendicular* CD *on the chord* AB, *then that perpendicular will biſect the chord* AB *in the point* D. To demonſtrate this, draw from the centre to the extremities of the chord the two lines CA, CB; then, ſince the lines CA and CB are equal, the angles CAB, CBA, which they ſubtend, muſt be equal alſo (by *art.* 62. *cor.* 2.), but the perpendicular CD divides the triangle ACB into two right angled triangles ACD and CDB, in which the ſum of the angles ACD and CAD in the one is equal to the ſum of the angles DCB and CDB in the other, each being equal to a right angle (by *cor.* 2. of *art.* 61.) but CAD is equal to CBD, therefore ACD is equal to BCD. So in the two triangles ACD and BCD, the two ſides AC and CD in the one, are equal to the two ſides BC and CD in the other, each to each reſpectively, and the included angles ACD and BCD are equal; therefore the remaining ſides AD and BD are equal (by art. 61.), and conſequently AB is biſected in D.

64. If from the centre C of a circle ABE, there be drawn a perpendicular CD on the chord AB, and produced till it meet the circle in F, then the line CF biſects the arch AB in the point F; for (ſee the foregoing figure) joining the points A and F, F and B by the ſtraight lines AF, FB, then in the triangles ADF, BDF, AD is equal to DB (by art. 63.), and DF common to both; therefore AD and DF, two ſides of the the triangle ADF, are equal to BD and DF, two ſides of the triangle BDF, and the included angles ADF BDF are equal, being both right; therefore (by art. 61.) the remaining ſides AF and FB are equal; but in the ſame circle equal lines are chords of equal arches, therefore the arches AF and FB are equal. So the whole arch AFB is biſected in the point F by the line CF.

Cor. 1. From art. 63. it follows, that any line biſecting a chord at right angles is a diameter; for ſince (by art. 63.) a line drawn from the centre perpendicular to a chord, biſects that chord at right angles; therefore, converſely, a line biſecting a chord at right angles, muſt paſs through the centre, and conſequently be a diameter.

Cor. 2. From the two laſt articles it follows, that the ſine of any arc is the half of the chord of twice the arc; for (ſee the foreging ſcheme) AD is the ſine of the arc AF, by the definition of a ſine, and AF is half the arc AFB, and AD half the chord AB (by art. 63.); therefore the *corollary* is plain.

65. In any triangle, the half of each ſide is the ſine of the oppoſite angle; for if a circle be ſuppoſed to be drawn through the three angular points A, B, and D of the triangle ABD, fig. 48. then the angle DAB is meaſured by half the arch BKD (by *cor.* 1. of *art.* 62.), but the half of BD, *viz.* BE, is the ſine of half the arch BKD, *viz.* the ſine of BK (by *cor.* 2. of the laſt), which is the meaſure of the angle BAD; therefore the half of BD is the ſine of the angle BAD: the ſame way, it may be proved, that the half of AD is the ſine of the angle ABD, and the half of AB is the ſine of the angle ADB.

66. The ſine, tangent, &c. of any arch is called alſo the *ſine*, *tangent*, &c. of the angle whoſe meaſure the arc is: thus, becauſe the arc GD (fig. 49.) is the meaſure of the angle GCD; and ſince GH is the ſine, DE the tangent, HD the verſed ſine, CE the ſecant, alſo GK the co-ſine, BF the co-tangent, and CF the co-ſecant, &c. of the arch GD; then GH is called the *ſine*, DE the *tangent*, &c. of the angle GCD, whoſe meaſure is the arch GD.

67. *If two equal and parallel lines,* AB *and* CD (fig. 50.) *be joined by two others,* AC *and* BD; *then theſe ſhall alſo be equal and parallel.* To demonſtrate this, join the two oppoſite angles A and D with the line AD; then it is plain this line AD divides the quadrilateral, ACDB, into two triangles, *viz.* ABD, ACD, in which AB a ſide of the one, is equal to DC a ſide of the other, by ſuppoſition, and AD is common to both triangles; and ſince AB is parallel to CD, the angle BAD will be equal to the angle ADC (by art. 36.); therefore in the two triangles BA and AD, and the angle BAD is equal to CD and DA, and the angle ADC; that is, two ſides and the included angle in the one is equal to two ſides and the included angle in the other; therefore (by art. 61.) BD is equal to AC, and ſince the angle DAC is equal to the angle ADB, therefore, the lines BD AC are parallel (by *cor. art.* 59.)

Cor. 1. Hence it is plain, that the quadrilateral ABDC is a parallelogram, ſince the oppoſite ſides are parallel.

Cor. 2. In any parallogram the line joining the oppoſite angles (called the *diagonal*) as DA, divides the figure into two equal parts, ſince it has been proved that the triangles ABD ACD are equal to one another.

Cor. 3. It follows alſo, that a triangle ACD on the ſame baſe CD, and between the ſame parallels with a parallelogram ABDC, is the half of that parallelogram.

Cor. 4. Hence it is plain, that the oppoſite ſides of a parallelogram are equal; for it has been proved, that ABDC being a parallelogram, AB will be equal to CD, and AC equal to BD.

68. All parallelograms on the ſame or equal baſes, and between the ſame parallels, are equal to one another; that is, if BD and GH (fig. 51.) be equal, and the lines BH and AF be parallel, then the parallelograms ABDC, BDFE, and EFHG, are equal to one another. For AC is equal to EF, each being equal to BD (by *cor.* 4. of 67.) To both add CE, than AE will be equal to CF. So in the two triangles ABE CDF, AB a ſide of the one, is equal to CD a ſide in the other; and AE is equal to CF, and the angle BAE is equal to the angle DCF (by art. 36); therefore the two triangles ABE CDF are equal (by art. 61.); and taking the triangle CKE from both, the figure ABKC will be equal to the figure KDFE; to both which add the little triangle KBD, then the parallelogram ABDC will be equal to the parallelogram BDFE. The ſame way it may be proved, that the parallelogram EFHG is equal to the parallelogram EFDB; ſo the three parallelograms ABDC, BDFE, and EFHG, will be equal to one another.

Cor. Hence it is plain, that triangles on the ſame baſe, and between the ſame parallels, are equal; ſince they are the half of the parallelograms on the ſame baſe and between the ſame parallels (by *cor.* 3. of laſt *art.*)

69. *In any right-angled triangle,* ABC, (fig. 52.) *the ſquare of the hypothenuſe* BC, *viz.* BCMH, *is equal to the ſum of the ſquares made on the two ſides* AB *and* AC, viz. *to* ABDE *and* ACGF. To demonſtrate this, through the point A draw AKL perpendicular to the hypothenuſe BC, join AH, AM, DC, and BG; then it is plain that DB is equal to BA (by art. 53.), alſo BH is equal to BC (by the ſame); ſo in the two triangles DBC ABH, the two ſides DB and BC in the one are equal to the two ſides AB and BH in the other; and the included angles DBC and ABH are alſo equal; (for DBA is equal to CBH, being both right; to each add ABC, then it is plain that DBC is equal to ABH) therefore the triangles DBC ABH are equal (by art. 61.), but the triangle DBC is half of the ſquare ADBE (by *cor.* 3. of 67.), and the triangle ABH is half the parallelogram BKLH (by the ſame), therefore half the ſquare ABDE is equal to half the parallelogram BKLH. Conſequently the ſquare ABDE is equal to the parallelogram BKLH. The ſame way it may be proved, that the ſquare ACGF is equal to the parallelogram KCML. So the ſum of the ſquares ABDE and ACGF is equal to the ſum of the parallelograms BKLH and KCML, but the ſum of theſe parallelograms is equal to the ſquare BCMH; therefore the ſum of the ſquares on AB and AC is equal to the ſquare on BC.

Cor. 1. Hence in a right-angled triangle, the hypothenuſe and one of the ſides being given, we may eaſily find the other, by taking the ſquare of the given ſide from the ſquare of the hypothenuſe, and the ſquare root of the remainder will be the ſide required.

Cor. 2. Hence the ſides in a right-angled triangle being given, we may find the hypothenuſe, by taking the ſum of the ſquares of the given ſides, and extracting the ſquare root of that ſum.

70. If upon the line AB (fig. 53.) there be drawn a ſemicircle ADB, whoſe centre is C, and on the point C there be raiſed a perpendicular to the line AB, *viz.* CD; then it is plain the arc DB is a quadrant, or contains 90 degrees; ſuppoſe the arc DB to be divided into 9 equal arcs, each of which will contain 10 degrees, then on the point B raiſing BE perpendicular to the line AB, it will be a tangent to the circle in quadrant, *viz.* B 10, B 20, B 30, B 40, *&c.* and if you draw the ſine, tangent, *&c.* (as in the ſcheme) we ſhall have the ſine, tangent, *&c.* to every 10 degrees in the quadrant: and the ſame way we may have the ſine, tangent, *&c.* to every ſingle degree in the quadrant, by dividing it into 90 equal parts beginning from B, and drawing the ſine, tangent, *&c.* to all the arcs beginning at the ſame point B. By this method they draw the lines of ſines, tangents, *&c.* of a certain circle on the ſcale; for after drawing them on the circle, they take the lengths of them, and ſet them off on the lines drawn for that purpoſe. The ſame way, by ſuppoſing the radius of any number of equal parts, (ſuppoſe 1000, or 10,000, *&c.*) it is plain the ſine, tangent, *&c.* of every arc muſt conſiſt of ſome number of theſe equal parts, and by computing them in parts of the radius, we have tables of ſines, tangents, *&c.* to every arc in the quadrant, called *natural ſines, tangents,* &c. and the logarithms of theſe give us tables of logarithmic ſines, tangents, *&c.* See Logarithms.

Plate CCXVI.

71. In any triangle, ABC, (fig. 1.) if one of its ſides, as AC, be biſected in E (and conſequently AC double of AE), and through E be drawn ED, parallel to BC, and meeting AB in D, then BC will be double of ED, and AB double of AD. Through D draw DF, parallel to AC, meeting BC in F: For ſince, by conſtruction, DF is parallel to AC, and DE parallel to BC; therefore (by art. 36.) the angle BFD will be equal to the angle BCA, and (by the ſame article) the angle BCA will be equal to the angle DEA, conſequently the angle BFD will be equal to the angle DEA; alſo (by art. 36.) the angle BDF will be equal to the angle DAE: and ſince DF is parallel to EC, and DE parallel to FC, the quadrilateral DFCE will be a parallelogram; and therefore (by art. 59. cor. 4.) DF will be equal to EC, which, by conſtruction, is equal to AE; ſo in the two triangles BDF DAE, the two angles BFD and BDF in the one, are equal to the two angles DEA and DAE in the other, each to each reſpectively; and the included ſide DF is equal to the included ſide AE; therefore (by art. 61. cor. 1.) AD will be equal to DB, and conſequently AB double of AD; alſo (by the ſame) DE will be equal to BF; but DE is alſo (by art. 67. cor. 4.) equal to FC; therefore BF and ED together, or BC, will be double of DE.

After the ſame manner it may be proved, that if in the triangle AKG, (fig. 2.) AE be taken equal to a third part of AK, and through E be drawn ED, parallel to KG, and meeting AG in D; then ED will be equal to a third part of GK; and AD equal to a third part of AG.

Likewiſe if in any triangle ABC, (fig. 3.) upon the ſide AB, be taken AE, equal to one-fourth, one-fifth, one-ſixth, *&c.* of AB, and through E be drawn ED parallel to BC and meeting AC in D; then D will be one-fourth, one fifth, one-ſixth, *&c.* of BC, and AD the like part of AC; and, in general, if in any triangle

General Principles.

angle ABC, there be aſſumed a point E on one of its ſides AB, and through that point be drawn a line ED, parallel to one of its ſides BC, and meeting the other ſide AC in D; then whatever part AE is of AB, the ſame part will ED be of BC, and AD of AC.

Cor. Hence it follows, that if in any triangle ABC, there be drawn ED, parallel to one of its ſides BC, and meeting the other two in the points E and D, then AE : AB :: ED : BC :: AD : AC; that is, AE is to AB, as ED is to BC, and that as AD to AC.

72. If any two triangles ABC, fig. 4. a b c, fig. 5. are ſimilar, or have all the angles of the one equal to all the angles of the other, each to each reſpectively; that is, the angle CAB equal to the angle c a b, and the angle ABC equal to the angle a b c, and the angle ACB equal to the angle a c b; then the ſides oppoſite to the equal angles are proportioned, *viz.* AB : a b :: AC : a c :: and AB : a b :: BC : b c :: and AC : a c :: BC : b c. On the ſide AB of the largeſt triangle ſet off AE equal to a b, and through E draw ED parallel to BC, meeting AC in D; then ſince DE and BC are parallel, and AB croſſing them, the angle AED will (by art. 36.) be equal to the angle ABC, which (by ſuppoſition) is equal to the angle a b c, alſo the angle DAE is by ſuppoſition) equal to the angle c a b; ſo in the two triangles AED, a b c, the two angles DAE AED of the one, are equal to two angles c a b a b c of the other, each to each reſpectively, and the included ſide AE is (by conſtruction) equal to the included ſide a b; therefore, (by art. 61. cor. 1) AD is equal to a c, and DE equal to cb; but ſince, in the triangle ABC, there is drawn DE parallel to BC one of its ſides, and meeting the two other ſides in the points D and E, therefore (by cor. art. 71.) AB : AE :: AC : AD, and AB : AE :: BC : DE, and AC : AD :: BC : DE; and in the three laſt proportions, inſtead of the lines AE, DE, and AD, putting in their equals a b, b c, and a c, we ſhall have AB : a b :: AC : a c, and AB : a b :: BC : b c, and laſtly, AC : a c :: BC : b c.

73. The chord, ſine, tangent, &c. of any arc in one circle, is to the chord, ſine, tangent, &c. of the ſame arc in another, as the radius of the one is to the radius of the other, fig. 6. 6. Let ABD a b d be two circles, BD b d two arcs of theſe circles, equal to one another, or conſiſting of the ſame number of degrees; FD f d the tangents, BD b d the chords, BE be the ſines, &c. of theſe two arcs BD b d, and CD c d the radii of the circles; then I ſay CD : c d :: FD : f d, and CD : c d :: BD : b d, and CD : c d :: BE : be, &c. For ſince the arcs BD bd are equal, the angles BCD b c d will be equal; and FD f d, being tangents to the points D and d, the angles CDF c d f will be equal, being each a right angle (art. 22.) ſo in the two triangles CDF c d f, the two angles FCD CDF of the one, being equal to the two angles f c d c d f of the other, each to each, the remaining angle CFD will be equal to the remaining angle c f d (by art. 60.); therefore the triangles CFD c f d are ſimilar, and conſequently (by art. 73.) CD : c d :: FD : f d. In the ſame manner it may be demonſtrated, that CD : c d :: BD : b d, and CD : c d :: BE : b e, &c.

74. Let ABD (fig. 7.) be a quadrant of a circle deſcribed by the radius CD; BD any arc of it, and BA its complement; BG or CF the ſine, CG or BF the coſine; DE the tangent, and CE the ſecant of that arc BD. Then ſince the triangles CDE CBG are ſimilar or equiangular, it will be (by art. 72.) DE : EC :: GB : BC. *i. e.* the tangent of any arc, is to the ſecant of the ſame, as the ſine of it is to the radius. Alſo ſince DE : EC :: GB : BC; therefore, by inverting that proportion, we have EC : DE :: BC : GB, *i. e.* the ſecant is to the tangent, as the radius is to the ſine of any arc.

Again, ſince the triangles CDE CGB are ſimilar, therefore (by art. 72.) it will be CD : CE :: CG : CB, *i. e.* as the radius is to the ſecant of any arc, ſo is the co-ſine of that arc to the radius. And by inverting the proportion we have this, *viz.* as the ſecant of any arc is to the radius, ſo is the radius to the coſine of that arc.

75. In all circles the chord of 60 degrees is always equal in length to the radius. Thus in the circle AEBD, (fig. 8.) if the arc AEB be an arc of 60 degrees, then drawing the chord AB, I ſay AB ſhall be equal to the radius CB or AC; for in the triangle ACB, the angle ACB is 60 degrees, being meaſured by the arc AEB; therefore the ſum of the other two angles is 120 degrees, (by *cor.* 1. of 60.); but ſince AC and CB are equal, the two angles CAB, CBA will alſo be equal; conſequently each of them half their ſum 120, *viz.* 60 degrees; therefore all the three angles are equal to one another, conſequently all the ſides, therefore AB is equal to CB.

Cor. Hence the radius from which the lines on any ſcale are formed, is the chord of 60 on the line of chords.

Geometrical Problems.

Prob. 1. From a point C (fig. 9.) in a given line AB to raiſe a perpendicular to that line.

Rule. From the point C take the equal diſtances CB, CA on each ſide of it. Then ſtretch the compaſſes to any greater diſtance than CB or CA, and with one foot of them in B, ſweep the arc EF with the other; again, with the ſame opening, and one foot in A, ſweep the arc GH with the other, and theſe two arcs will interſect one another in the point D; then join the given points C and D with the line CD, and that ſhall be the perpendicular required.

2. To divide a given right line AB (fig. 10.) into two equal parts; that is, to biſect it.

Rule. Take any diſtance with your compaſſes that you are ſure is greater than half the given line; then ſetting one foot of them in B, with the other ſweep the arc DFC: and with the ſame diſtance, and one foot in A, with the other ſweep the arc CED; theſe two arcs will interſect one another in the points CD, which joined by the right line CD will biſect AB in G.

3. From a given point D, (fig. 11.) to let fall a perpendicular on a given line AB.

Rule. Set one foot of the compaſſes in the point D, and extend the other to any greater diſtance than the leaſt diſtance between the given point and the line, and with that extent ſweep the arc AEB, cutting the line in the two points A and B, then (by the laſt prob.) biſect the line AB in the point C; laſtly, join C and D, and that line CD is the perpendicular required.

4. (Fig. 12.) Upon the end B of a given right line BA, to raiſe a perpendicular.

Rule. Take any extent in your compaſſes, and with one foot in B fix the other in any point C without the given line; then with one point of the compaſſes in C, deſcribe with the other the circle EBD, and through E and C draw the diameter ECD meeting the circle in D; join D and B, and the right line DB is that required; for EBD is a right angle (by *cor.* 4. of 63.)

5. (Fig. 13.) To draw one line parallel to another given line AB, that ſhall be diſtant from one another by any given diſtance D.

Rule. Extend your compaſſes to the given diſtance D; then ſetting one foot of them in any point of the given line (ſuppoſe A,) with the other ſweep the arc FCG; again, at the ſame extent, and one foot in any other point of the given line B, ſweep the arc HDK, and draw the line CD touching them, and that will be parallel to the given line AB, and diſtant from it by the line D as was required.

6. (Fig. 14.) To divide a given line AB into any number of equal parts, ſuppoſe 7.

Rule. From the point A draw any line AD, making an angle with the line AB, then through the point B, draw a line BC parallel to AD; and from A, with any ſmall opening of the compaſſes, ſet off a number of equal parts (on the line AD) leſs by one than the propoſed number (here 6.); then from B ſet off the ſame number of the ſame parts (on the line BC); laſtly, join 1 and 6, 2 and 5, 3 and 4, 4 and 3, 5 and 2, 6 and 1, and theſe lines will cut the given line as required.

7. (Fig. 15.) To quarter a given circle, or to divide it into four equal parts.

Rule. Through the centre C of the given circle, draw a diameter AB, then upon the point C raiſe a perpendicular DCE to the line AB; and theſe two diameters AB and DE ſhall quarter the circle.

8. (Fig. 16.) Through three given points A, B, and D, to draw a circle. *Note*, the three points muſt not lie in the ſame ſtraight line.

Rule. Join A and B, alſo B and D, with the ſtraight lines AB BD; then (by prob. 2.) biſect AB with the line EC, alſo BD with the line FC, which two lines will cut one another in ſome point C; that is the centre of the circle required: then fixing one point of your compaſſes in C, and ſtretching the other to A, deſcribe the circle ABDG, which will paſs through the three points given. The reaſon of this is plain from cor. 1. of art. 64.

9. (Fig. 17.) From the point A of the given line AB, to draw another line (ſuppoſe AC) that ſhall make with AB an angle of any number of degrees, ſuppoſe 45.

Rule. Let the given line AB be produced, then take off your ſcale the length of the chord of 60 degrees, which is equal to the radius of the circle the ſcale was made for (by art. 75.); and ſetting one foot in A, with the other ſweep the arc BC; then with your compaſſes take from your ſcale the chord of 45 degrees, and ſet off that diſtance from B to C. Laſtly, join A and C, and the line AC is that required. For the angle CAB, which is meaſured by the arc BC, is an angle of 45 degrees, as was required.

10. An angle BAC (fig. 18.) being given, to find how many degrees it contains.

Rule. With your compaſſes take the length of your chord of 60 from your ſcale. Then, ſetting one foot of them in A, with the other ſweep the arc BC, which is the arc comprehended between the two ſides AB, AC produced if needful. Laſtly, take with your compaſſes the diſtance BC, and applying it to your line of chords on the ſcale, you will find how many degrees the arc BC contains, and conſequently the degrees of the angle BAC which was required.

11. Three lines *x*, *y*, and *z* being given, (fig. 19.) to form a triangle of them; but any two of theſe lines taken together muſt always be greater than the third.

Rule. Make any one of them, as *x*, the baſe; then with your compaſſes take another of them, as *z*, and ſetting one foot in one end of the line *x*, as B, with the other ſweep the arc DE; and taking with your compaſſes the length of the other *y*, ſet one foot of them in A, the other end of the line *x*, and with the other ſweep the arc FG, which will cut the other in C, laſtly, join CA and CB, and the triangle CAB is that required.

12. To make a triangle, having one of its ſides of any number of equal parts (ſuppoſe 160,) and one of the angles at that ſide 50 degrees, and the other 44 degrees.

Rule. Draw an indefinite line ED, (fig. 20.) then take off the line of equal parts with your compaſſes, 160 of them, and ſet them on the indefinite line, as BC; then (by prob. 9.) draw BA, making the angle ABC of 50 degrees, and (by the ſame) draw from C the line AC, making the angle ACB of 44 degrees; which two lines will meet one another in A, and the triangle ABC is that required. See TRIGONOMETRY.

13. Upon a given line AB (fig. 21.) to make a ſquare.

Rule. Upon the extremity A of the given line AB, raiſe a perpendicular AC (by prob. 4); then take AC equal to AB, and with that extent, ſetting one foot of the compaſſes in C, ſweep with the other foot the arc GH; then with the ſame extent, and one foot in B, with the other ſweep the arc EF, which will meet the former in ſome point D; laſtly, join C and D, D and B, and the figure ABDC will be the ſquare required.

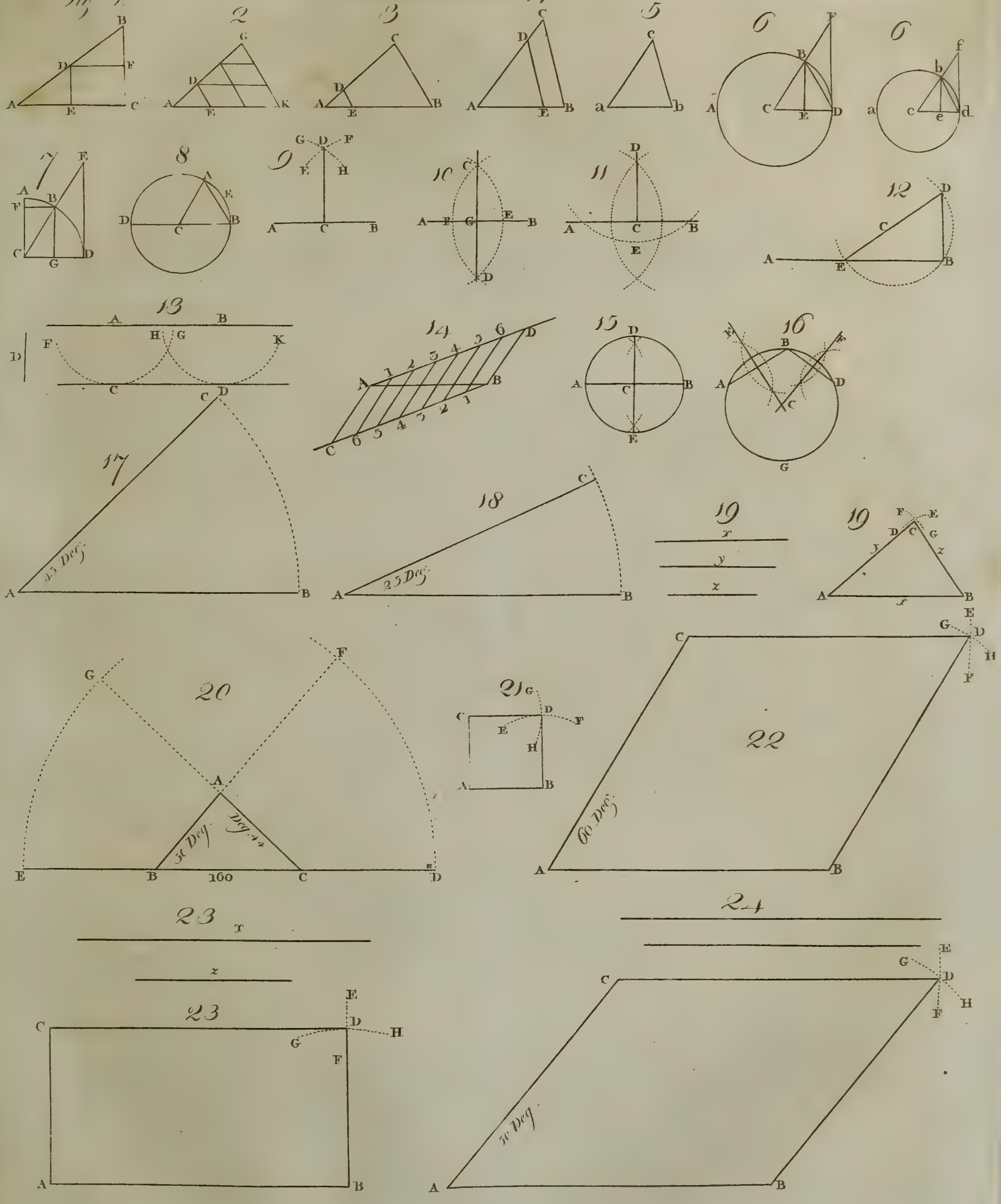
14. On a given line AB (fig. 22.) to draw a rhombus that ſhall have one of its angles equal to any number of degrees, ſuppoſe 60 degrees.

Rule. From the point A of the given line AB, draw the line AC, making the angle CAB of 60 degrees, (by prob. 9.) then take AC equal to AB, and with that extent, fixing one foot of the compaſſes in B, with the other deſcribe the arc GH; and at the ſame extent fixing one foot of the compaſſes in C, with the other deſcribe the arc EF cutting the former in D; laſtly, join CD and DB, and the figure ACDB is that required.

16. Given two lines *x* and *z*, of theſe two to make a rectangle.

Rule. Draw a line, as AB, (fig. 23. 23.) equal in length to one of the given lines *x*; and on the extremity A of that line raiſe a perpendicular AC, on which

GEOMETRY N°. II. Plate CCXVI.



which take AC equal to the other line z; then take with your compaſſes the length of the line AB, and at that extent, fixing one foot of them in C, with the other ſweep the arc EF; and alſo taking with your compaſſes the extent of the line AC, fix one foot of them in B, and with the other ſweep the arc GH, which will meet the former in D; laſtly, join CD and BD, and the figure ABDC will be that required.

16. Two lines x and z being given, of theſe to form a rhomboides that ſhall have one of its angles any number of degrees, ſuppoſe 50.

Rule. Draw a line AB (fig. 24. 24.) equal in length to one of the lines, as x; then draw the line AC, making with the former the angle BAC equal to that propoſed, ſuppoſe 50 degrees, and on that line take AC equal to the given line z; then with your compaſſes take the length of AB, and fixing one foot in C, ſweep the arc EF; alſo taking the length of AC, and ſetting one foot in B, with the other ſweep the arc GH, which will cut the former in D; then join CD and DB, ſo the figure ACDB will be that required.

PART II. THE APPLICATION OF THE FOREGOING PRINCIPLES TO THE MENSURATION OF SURFACES, SOLIDS, &c.

CHAP. I. *Of the Menſuration of Lines and Angles.*

A Line or length to be meaſured, whether it be diſtance, height, or depth, is meaſured by a line leſs than it. In Scotland the leaſt meaſure of length is an inch: not that we meaſure no line leſs than it, but becauſe we do not uſe the name of any meaſure below that of an inch; expreſſing leſſer meaſures by the fractions of an inch: and in this treatiſe we uſe decimal fractions as the eaſieſt. Twelve inches make a foot; three feet and an inch make the Scots ell; ſix ells make a fall; forty falls make a furlong; eight furlongs make a mile: ſo that the Scots mile is 1184 paces, accounting every pace to be five feet. Theſe things are according to the ſtatutes of Scotland; notwithſtanding which, the glaziers uſe a foot of only eight inches; and other artiſts for the moſt part uſe an Engliſh foot, on account of the ſeveral ſcales marked on the Engliſh foot-meaſure for their uſe. But the Engliſh foot is ſomewhat leſs than the Scots; ſo that 185 of theſe make 186 of thoſe.

Lines, to the extremities and any intermediate point of which you have eaſy acceſs, are meaſured by applying to them the common meaſure a number of times. But lines, to which you cannot have ſuch acceſs, are meaſured by methods taken from geometry; the chief whereof we ſhall here endeavour to explain. The firſt is by the help of the geometrical ſquare.

"As for the Engliſh meaſures, the yard is 3 feet, or 36 inches. A pole is ſixteen feet and a half, or five yards and a half. The chain, commonly called *Gunter's Chain*, is four poles, or 22 yards, that is, 66 feet. An Engliſh ſtatute-mile is fourſcore chains, or 1760 yards, that is, 5280 feet.

"The chain (which is now much in uſe, becauſe it is very convenient for ſurveying) is divided into 100 links, each of which is $7\frac{92}{100}$ of an inch: whence it is eaſy to reduce any number of thoſe links to feet, or any number of feet to links.

"A chain that may have the ſame advantages in ſurveying Scotland, as Gunter's chain has in England, ought to be in length 74 feet, or 24 Scots ells, if no regard is had to the difference of the Scots and Engliſh foot abovementioned. But if regard is had to that difference the Scots chain ought to conſiſt of $74\frac{2}{5}$ Engliſh feet, or 74 feet 4 inches and $\frac{4}{5}$ths of an inch. This chain being divided into 100 links, each of thoſe links is 8 inches and $\frac{928}{1000}$ of an inch. In the following table, the moſt noted meaſures are expreſſed in Engliſh inches and decimals of an inch."

	Engliſh Inch.	*Dec.*
The Engliſh foot, is - -	12	000
The Paris foot, -	12	788
The Rhindland foot meaſured by Mr Picart,	12	362
The Scots foot, - - -	12	065
The Amſterdam foot, by Snellius and Picart,	11	172
The Dantzic foot, by Hevelius, -	11	297
The Daniſh foot, by Mr Picart, -	12	465
The Swediſh foot, by the ſame, -	11	692
The Bruſſels foot, by the ſame, -	10	828
The Lyons foot, by Mr Auzout, -	13	458
The Bononian foot, by Mr Caſſini, -	14	938
The Milan foot, by Mr Auzout, -	15	631
The Roman palm uſed by merchants, according to the ſame, - -	9	791
The Roman palm uſed by architects,	8	779
The palm of Naples, according to Mr Auzout,	10	314
The Engliſh yard, - -	36	000
The Engliſh ell, - -	45	000
The Scots ell, - - -	37	200
The Paris aune uſed by mercers, according to Mr Picart, - -	46	786
The Paris aune uſed by drapers, according to the ſame, - - -	46	680
The Lyons aune, by Mr Auzout, -	46	570
The Geneva aune, - -	44	760
The Amſterdam ell, - -	26	800
The Daniſh ell, by Mr Picart, -	24	930
The Swediſh ell, - -	23	380
The Norway ell, - -	24	510
The Brabant or Antwerp ell, -	27	170
The Brüſſels ell, - -	27	260
The Bruges ell, - -	27	550
The brace of Bononia, according to Auzout,	25	200
The brace uſed by architects in Rome,	30	730
The brace uſed in Rome by merchants,	34	270
The Florence brace uſed by merchants, according to Picart, - -	22	910
The Florence geographical brace, -	21	570
The vara of Seville, -	33	127
The vara of Madrid, - -	39	166
The vara of Portugal, - -	44	031
The cavedo of Portugal, -	27	354
The ancient Roman foot, -	11	632
The Perſian ariſh, according to Mr Græves,	38	364
The ſhorter pike of Conſtantinople, according to the ſame, - -	25	576
Another pike of Conſtantinople, according to Meſſrs Mallet and De la Porte, -	27	920

PROPOSITION I.

Plate CCXVII.

PROB. *To deſcribe the ſtructure of the geometrical ſquare.*—The geometrical ſquare is made of any ſolid matter, as braſs or wood, or of any four plain rulers joined together at right angles (as in fig. 1.), where A is the centre, from which hangs a thread with a ſmall weight at the end, ſo as to be directed always to the centre. Each of the ſides BE and DE is divided into an hundred equal parts, or (if the ſides be long enough to admit of it) into a thouſand parts; C and F are two ſights, fixed on the ſide AD. There is moreover an index GH, which, when there is occaſion, is joined to the centre A, in ſuch manner as that it can move round, and remain in any given ſituation. On this index are two ſights perpendicular to the right line going from the centre of the inſtrument: theſe are K and L. The ſide DE of the inſtrument is called the upright ſide; BE the reclining ſide.

PROPOSITION II.

FIG. 2. *To meaſure an acceſſible height* AB *by the help of a geometrical ſquare, its diſtance being known.*—Let BR be an horizontal plane, on which there ſtands perpendicularly any line AB: let BD, the given diſtance of the obſervator from the height, be 96 feet: let the height of the obſervator's eye be ſuppoſed 6 feet; and let the inſtrument, held by a ſteady hand, or rather leaning on a ſupport, be directed towards the ſummit A, ſo that one eye (the other being ſhut) may ſee it clearly through the ſights; the perpendicular or plumb-line meanwhile hanging free, and touching the ſurface of the inſtrument; let now the perpendicular be ſuppoſed to cut off on the right ſide KN 80 equal parts. It is clear that LKN, ACK, are ſimilar triangles; for the angles LKN, ACK are right angles, and therefore equal; moreover, LN and AC are parallel, as being both perpendicular to the horizon; conſequently (by art. 60. cor. 1. Part I.), the angles KLN, KAC, are equal; wherefore (by art. 60. cor. 2. of Part I.), the angles LNK and CAK are likewiſe equal: ſo that in the triangles NKL, KAC, (by art. 72. of Part I.) as NK : KL :: KC (i. e. BD) : CA; that is, as 80 to 100, ſo is 96 feet to CA. Therefore, by the rule of three, CA will be found to be 120 feet; and CB, which is 6 feet, being added, the whole height is 126 feet.

But if the diſtance of the obſervator from the height, as BE, be ſuch, that when the inſtrument is directed as formerly toward the ſummit A, the perpendicular falls on the angle P, oppoſite to H, the centre of the inſtrument, and BE or CG be given of 120 feet; CA will alſo be 120 feet. For in the triangles HGP, ACG, equiangular, as in the preceding caſe, as PG : GH :: GC : CA. But PG is equal to GH; therefore GC is likewiſe equal to CA: that is, CA will be 120 feet, and the whole height 126 feet as before.

Let the diſtance BF be 300 feet, and the perpendicular or plumb-line cut off 40 equal parts from the reclining ſide: Now, in this caſe, the angles QAC, QZI, are equal, and the angles QZI, ZIS, are equal: therefore the angle ZIS is equal to the angle QAC. But the angles ZSI, QCA are equal, being right angles; therefore, in the equiangular triangles ACQ, SZI, it will be, as ZS : SI :: CQ : CA; that is, as 100 to 40, ſo is 300 to CA. Wherefore, by the rule of three, CA will be found to be of 120 feet. And, by adding the height of the obſervator, the whole BA will be 126 feet. Note, that the height is greater than the diſtance, when the perpendicular cuts the upright ſide, and leſs if it cut the reclining ſide; and that the height and diſtance are equal, if the perpendicular fall on the oppoſite angle.

SCHOLIUM.

If the height of a tower to be meaſured as above, end in a point (as in fig. 3.), the diſtance of the obſervator oppoſite to it, is not CD, but is to be accounted from the perpendicular to the point A; that is, to CD muſt be added the half of the thickneſs of the tower, viz. BD: which muſt likewiſe be underſtood in the following propoſitions, when the caſe is ſimilar.

PROPOSITION III.

FIG. 4. *From the height of a tower* AB *given, to find a diſtance on the horizontal plane* BC, *by the geometrical ſquare.*—Let the inſtrument be ſo placed, as that the mark C in the oppoſite plane may be ſeen through the ſights; and let it be obſerved how many parts are cut off by the perpendicular. Now, by what hath been already demonſtrated, the triangles AEF, ABC, are ſimilar; therefore, it will be as EF to AE, ſo AB (compoſed of the height of the tower BG) and of the height of the centre of the inſtrument A, above the tower BG) to the diſtance BC. Wherefore, if, by the rule of three, you ſay, as EF to AE, ſo is AB to BC, it will be the diſtance ſought.

PROPOSITION IV.

FIG. 5. *To meaſure any diſtance at land or ſea, by the geometrical ſquare.*—In this operation, the index is to be applied to the inſtrument, as was ſhown in the deſcription; and, by the help of a ſupport, the inſtrument is to be placed horizontally at the point A; then let it be turned till the remote point F, whoſe diſtance is to be meaſured, be ſeen through the fixed ſights; and bringing the index to be parallel with the other ſide of the inſtrument, obſerve by the ſights upon it any acceſſible mark B, at a ſenſible diſtance: then carrying the inſtrument to the point B, let the immoveable ſights be directed to the firſt ſtation A, and the ſights of the index to the point F. If the index cut the upright ſide of the ſquare, as in K, in the two triangles BRK, and BAF, which are equiangular, it will be as BR to RK, ſo BA (the diſtance of the ſtations to be meaſured with a chain) to AF; and the diſtance AF ſought will be found by the rule of three. But if the index cut the reclining ſide of the ſquare in any point L, where the diſtance of a more remore point (G) is ſought: in the triangles BLS, BAG, the ſide LS ſhall be to SB, as BA to AG, the diſtance ſought; which accordingly will be found by the rule of three.

PROPOSITION V.

FIG. 6. *To meaſure an acceſſible height by means of a plain mirror.*—Let AB be the height to be meaſured: let the mirror be placed at C, in the horizontal plane BD, at a known diſtance BC; let the obſerver go back to D, till he ſee the image of the ſummit in the mirror, at a certain point of it, which he muſt diligently mark; and let DE be the height of the obſervator's eye. The triangles ABC and EDC are equiangular; for the angles at D and B are right angles; and ACB, ECD, are equal, being the angles

of incidence and reflexion of the ray AC, as is demonſtrated in optics; wherefore the remaining angles at A and E are alſo equal; therefore it will be as CD to DE, ſo CB to BA; that is, as the diſtance of the obſervator from the point of the mirror, in the right line betwixt the obſervator and the height, is to the height of the obſervator's eye, ſo is the diſtance of the tower from that point of the mirror, to the height of the tower ſought; which therefore will be found by the rule of three.

Note 1. The obſervation will be more exact, if, at the point D, a ſtaff be placed in the ground perpendicularly, over the top of which the obſervator may ſee a point of the glaſs exactly in a line betwixt him and the tower.

Note 2. In place of a mirror may be uſed the ſurface of water contained in a veſſel, which naturally becomes parallel to the horizon.

PROPOSITION VI.

Fig. 7. *To meaſure an acceſſible height* AB *by means of two ſtaffs.*—Let there be placed perpendicularly in the ground a longer ſtaff DE, likewiſe a ſhorter one FG, ſo as the obſervator may ſee A, the top of the height to be meaſured, over the ends DF of the two ſtaffs; let FH and DC, parallel to the horizon, meet DE and AB in H and C; then the triangles FHD, DCA, ſhall be equiangular; for the angles at C and H are right ones; likewiſe the angle A is equal to the angle FDH; wherefore the remaining angles DFH, and ADC, are alſo equal: wherefore, as FH, the diſtance of the ſtaffs, to HD, the exceſs of the longer ſtaff above the ſhorter; ſo is DC, the diſtance of the longer ſtaff from the tower, to CA, the exceſs of the height of the tower above the longer ſtaff. And thence CA will be found by the rule of three.

To which if the length DE be added, you will have the whole height of the tower BA.

SCHOLIUM

Fig. 8. Many other methods may be occaſionally contrived for meaſuring an acceſſible height. For example, from the given length of the ſhadow BD, to find out the height AB, thus: Let there be erected a ſtaff CE perpendicularly, producing the ſhadow EF: The triangles ABD, CEF, are equiangular; for the angles at B and E are right; and the angles ADB and CFE are equal, each being equal to the angle of the ſun's elevation above the horizon: Therefore, as EF, the ſhadow of the ſtaff, to EC, the ſtaff itſelf; ſo BD the ſhadow of the tower, to BA, the height of the tower. Though the plane on which the ſhadow of the tower falls be not parallel to the horizon, if the ſtaff be erected in the ſame plane, the rule will be the ſame.

PROPOSITION VII.

To meaſure an inacceſſible height by means of two ſtaffs.—Hitherto we have ſuppoſed the height to be acceſſible, or that we can come at the lower end of it; now if, becauſe of ſome impediment, we cannot get to a tower, or if the point whoſe height is to be found out be the ſummit of a hill, ſo that the perpendicular be hid within the hill; if, for want of better inſtruments, ſuch an inacceſſible height is to be meaſured by means of two ſtaffs, let the firſt obſervation be made with the ſtaffs DE and FG, (as in prop. 6.); then the obſervator is to go off in a direct line from the height and firſt ſtation, till he come to the ſecond ſtation: where (fig. 11.) he is to place the longer ſtaff perpendicularly at RN, and the ſhorter ſtaff at OK, ſo that the ſummit A may be ſeen along their tops; that is, ſo that the point KNA may be in the ſame right line. Through the point N, let there be drawn the right line NP parallel to FA: Wherefore in the triangles KNP, KAF, the angles KNP, KAF are equal, alſo the angle AKF is common to both; conſequently the remaining angle KPN is equal to the remaining angle KFA. And therefore, PN : FA : : KP : KF. But the triangles PNL, FAS are ſimilar; therefore, PN : FA : : NL : SA. Therefore (by the 11. 5. Eucl.) KP : KF : : NL : SA. Thence, alternately, it will be, as KP (the exceſs of the greater diſtance of the ſhort ſtaff from the long one above its leſſer diſtance from it) to NL: the exceſs of the longer ſtaff above the ſhorter; ſo KF, the diſtance of the two ſtations of the ſhorter ſtaff to SA, the exceſs of the height ſought above the height of the ſhorter ſtaff. Wherefore SA will be found by the rule of three. To which let the height of the ſhorter ſtaff be added, and the ſum will give the whole inacceſſible height BA.

Noie 1. In the ſame manner may an inacceſſible height be found by a geometrical ſquare, or by a plain ſpeculum. But we ſhall leave the rules to be found out by the ſtudent, for his own exerciſe.

Note 2. That by the height of the ſtaff we underſtand its height above the ground in which it is fixed.

Note 3. Hence depends the method of uſing other inſtruments invented by geometricians: for example, of the geometrical croſs: and if all things be juſtly weighed a like rule will ſerve for it as here. But we incline to touch only upon what is moſt material.

PROPOSITION VIII.

Fig. 9. *To meaſure the diſtance* AB, *to one of whoſe extremities we have acceſs, by the help of four ſtaffs.*—Let there be a ſtaff fixed at the point A; then going back at ſome ſenſible diſtance in the ſame right line, let another be fixed in C, ſo as that both the points A and B be covered and hid by the ſtaff C; likewiſe going off in a perpendicular from the right line CB, at the point A (the method of doing which ſhall be ſhown in the following ſcholium), let there be placed another ſtaff at H; and in the right line CGK (perpendicular to the ſame CB, at the point C), and at the point of it K, ſuch that the points K, H, and B may be in the ſame right line, let there be fixed a fourth ſtaff. Let there be drawn, or let there be ſuppoſed to be drawn, a right line GH parallel to CA. The triangles KGH HAB, will be equiangular; for the angles HAB, KGH are right angles. Alſo the angles ABH, KHG are equal; wherefore, as KG (the exceſs of CK above AH) to GH, or to CA, the diſtance betwixt the firſt and ſecond ſtaff; ſo is AH, the diſtance betwixt the firſt and third ſtaff, to AB the diſtance ſought.

SCHOLIUM.

Fig. 10. To drawn on a plane a right line AE perpendicular to CH, from a given point A: take the right lines AB AD, on each ſide equal: and in the points B and D, let there be fixed ſtakes, to which let there be tied two equlal ropes BE, DE, or one having a mark in the middle, and holding in your hand their extremities joined (or the mark in the middle, if it be but one), draw out the ropes on the ground; and

then where the two ropes meet, or at the mark, when by it the rope is fully ſtretched, let there be placed a third ſtake at E ; the right Line AE will be perpendicular to CH in the point A (prob. I. of Part I.). In a manner not unlike to this, may any problems, that are reſolved by the ſquare and compaſſes, be done by ropes and a cord turned round as a radius.

PROPOSITION IX.

Fig. 12. *To meaſure the diſtance* AB, *one of whoſe extremities is acceſſible.*—From the point A, let the right line AC of a known length be made perpendicular to AB (by the preceding ſcholium) : likewiſe draw the right line CD perpendicular to CB, meeting the right line AB in D : then as DA : AC : : AC : AB. Wherefore, when DA and AC are given, AB will be found by the rule of three.

SCHOLIUM.

All theſe preceding operations depend on the equality of ſome angles of triangles, and on the ſimilarity of the triangles ariſing from that equality. And on the ſame principles depend innumerable other operations which a geometrician will find out of himſelf, as is very obvious. However, ſome of theſe operations require ſuch exactneſs in the work, and without it are ſo liable to errors, that, *cæteris paribus*, the following operations, which are performed by a trigonometrical calculation, are to be preferred ; yet could we not omit thoſe above, being moſt eaſy in practice, and moſt clear and evident to thoſe who have only the firſt elements of geometry. But if you are provided with inſtruments, the following operations are more to be relied upon. We do not inſiſt on the eaſieſt caſes to thoſe who are ſkilled in plain trigonometry, which is indeed neceſſary to any one who would apply himſelf to practice. See Trigonometry.

PROPOSITION X.

Fig. 13. *To deſcribe the conſtruction and uſe of the geometrical quadrant.*—The geometrical quadrant is the fourth part of a circle divided into 90 degrees, to which two ſights are adapted, with a perpendicular or plumb-line hanging from the centre. The general uſe of it is for inveſtigating angles in a vertical plane, comprehended under right lines going from the centre of the inſtrument, one of which is horizontal, and the other is directed to ſome viſible point. This inſtrument is made of any ſolid matter, as wood, copper, &c.

PROPOSITION XI.

Fig. 14. *To deſcribe and make uſe of the graphometer.*—The graphometer, is a ſemicircle made of any hard matter, of wood, for example, or braſs, divided into 180 degrees ; ſo fixed on a fulcrum, by means of a braſs ball and ſocket, that it eaſily turns about, and retains any ſituation ; two ſights are fixed on its diameter. At the centre there is commonly a magnetical needle in a box. There is likewſe a moveable ruler, which turns round the centre, and retains any ſituation given it. The uſe of it is to obſerve any angle, whoſe vertex is at the centre of the inſtrument in any plane (though it is moſt commonly horizontal, or nearly ſo), and to find how many degrees it contains.

PROPOSITION XII.

Fig. 15. and 16. *To deſcribe the manner in which angles are meaſured by a quadrant or graphometer.*—Let there be an angle in a vertical plane, comprehended between a line parallel to the horizon HK, and the right line RA, coming from any remarkable point of a tower or hill, or from the ſun, moon, or a ſtar. Suppoſe that this angle RAH is to be meaſured by the quadrant : let the inſtrument be placed in the vertical plane, ſo that the centre A may be in the angular point ; and let the ſights be directed towards the object at R (by the help of the ray coming from it, if it be the ſun or moon, or by the help of the viſual ray, if it is any thing elſe), the degrees and minutes in the arc BC, cut off by the perpendicular, will meaſure the angle RAH required. For, from the make of the quadrant, BAD is a right angle ; therefore BAR is likewiſe right, being equal to it. But, becauſe HK is horizontal, and AC perpendicular, HAC will be a right angle : and therefore equal alſo to BAR. From thoſe angles ſubtract the part HAB that is common to both ; and there will remain the angle BAC equal to the angle RAH. But the arc BC is the meaſure of the angle BAC ; conſequently, it is likewiſe the meaſure of the angle RAH.

Note, That the remaining arc on the quadrant DC is the meaſure of the angle RAZ, comprehended between the aforeſaid right line RA and AZ which points to the zenith.

Let it now be required to meaſure the angle ACB (fig. 16.) in any plane, comprehended between the right lines AC and BC, drawn from two points A and B, to the place of ſtation C. Let the graphometer be placed at C, ſupported by its fulcrum (as was ſhown above) ; and let the immoveable ſights on the ſide of the inſtrument DE be directed towards the point A ; and likewiſe (while the inſtrument remains immoveable) let the ſights of the ruler FG (which is moveable about the centre C) be directed to the point B. It is evident that the moveable ruler cuts off an arc DH, which is the meaſure of the angle ACB ſought. Moreover, by the ſame method, the inclination of CE, or of FG, may be obſerved with the meridian line, which is pointed out by the magnetic needle incloſed in the box, and is moveable about the centre of the inſtrument, and the meaſure of this inclination or angle found in degrees.

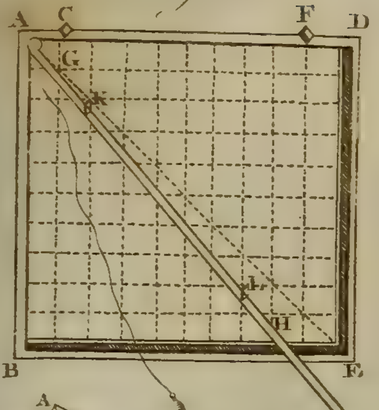
PROPOSITION XIII.

Fig. 17. *To meaſure an acceſſible height by the geometrical quadrant.*—By the 12th prop. of this Part, let the angle C be found by means of the quadrant. Then in the triangle ABC, right-angled at B (BC being ſuppoſed the horizontal diſtance of the obſervator from the tower), having the angle at C, and the ſide BC, the required height BA will be found by the 3d caſe of plane trigonometry. See trigonometry.

PROPOSITION XIV.

Fig. 18. *To meaſure an inacceſſible height by the geometrical quadrant.*—Let the angle ACB be obſerved with the quadrant (by the 12th prop. of this Part) ; then let the obſerver go from C to the ſecond ſtation D, in the right line BCD (provided BCD be a horizontal plane) ; and after meaſuring this diſtance CD, take the angle ACD likewiſe with the quadrant. Then, in the triangle ACD, there is given the angle ADC, with the angle ACD ; becauſe ACB was given before : therefore (by art. 59. of Part I.) the remaining angle CAD is given likewiſe. But the ſide CD is

Fig. 1.



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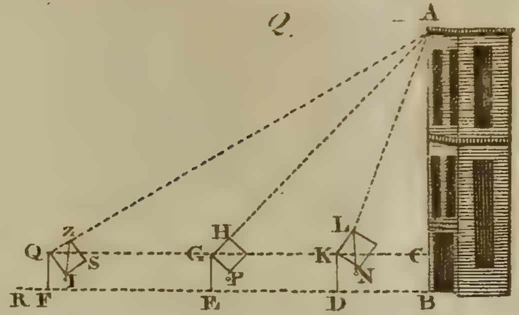

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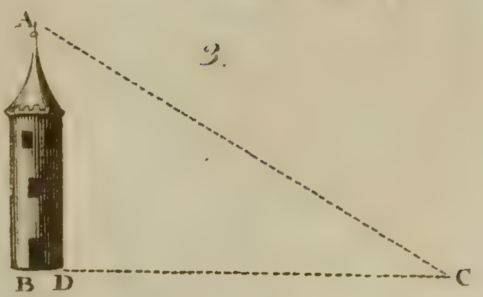

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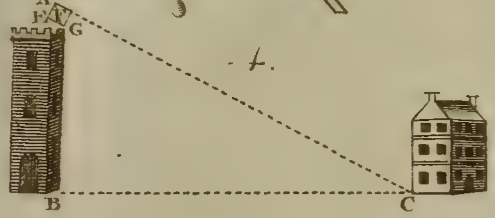

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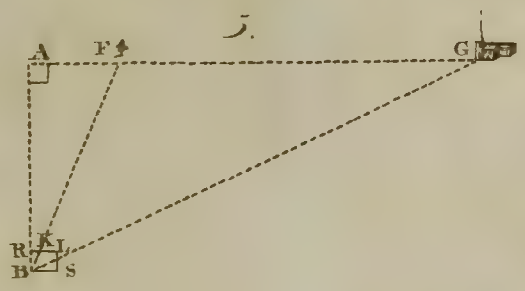

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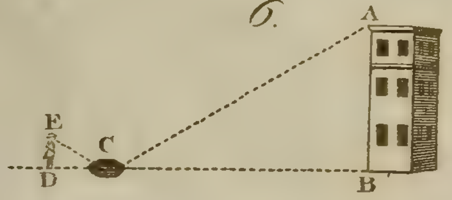

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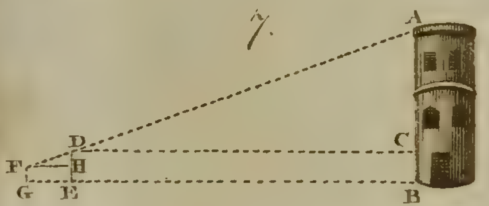

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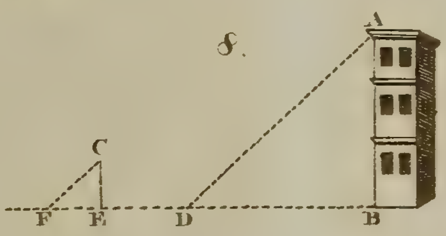

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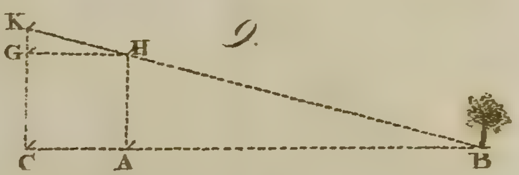

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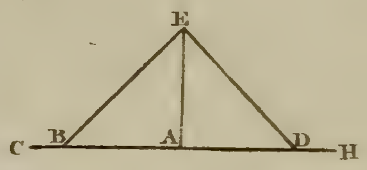

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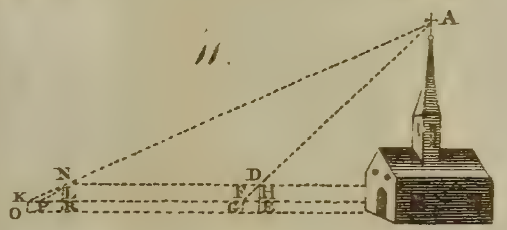

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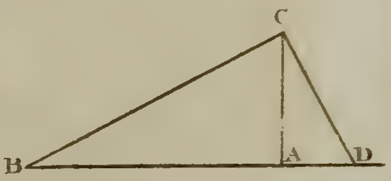

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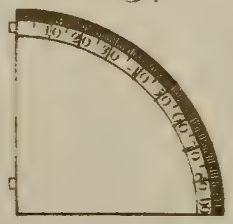

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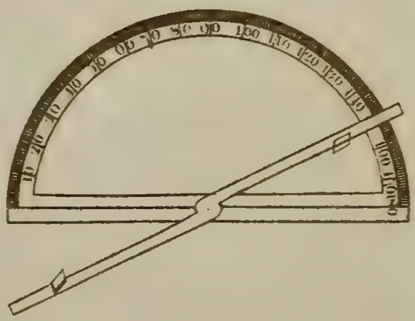

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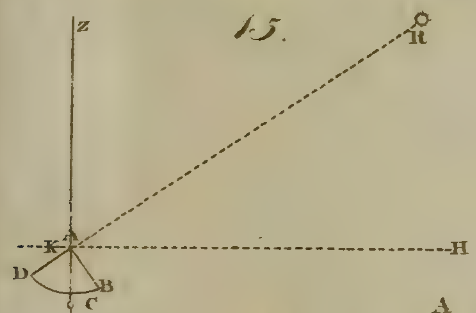

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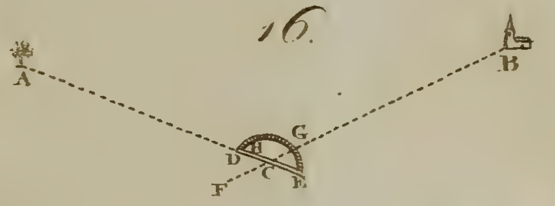

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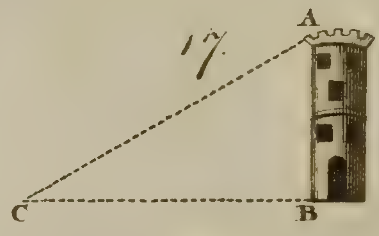

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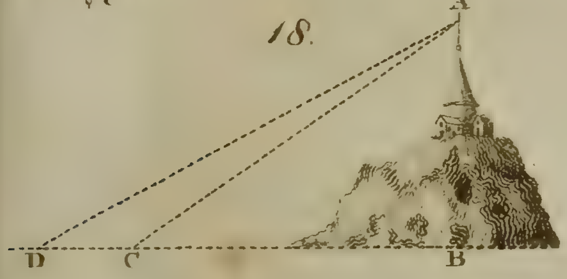

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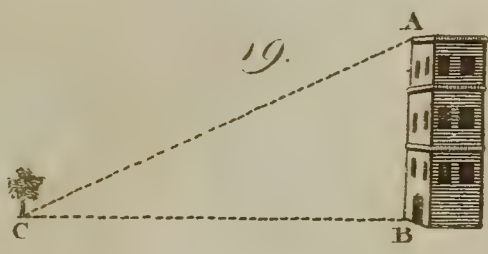

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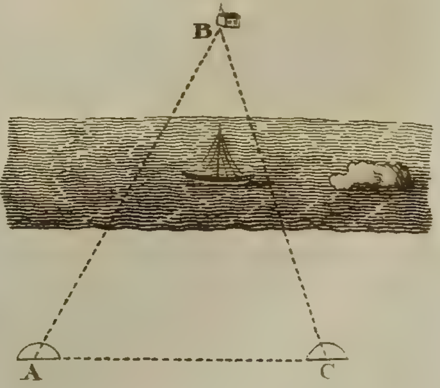

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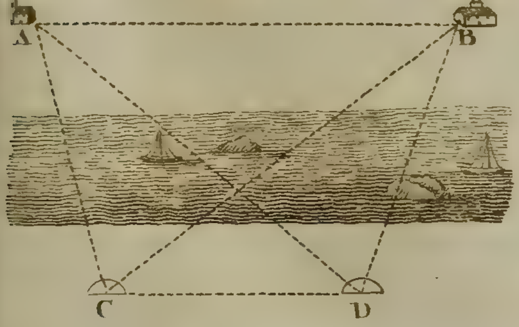

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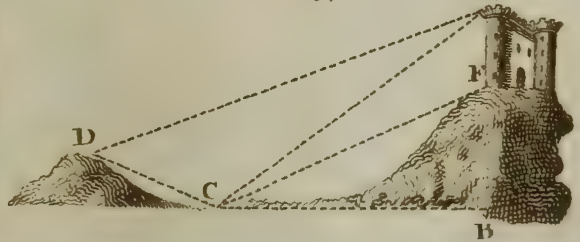


and likewiſe given, being the diſtance of the ſtations C and D; therefore (by the firſt caſe of oblique-angled triangles in trigonometry) the ſide AC will be found. Wherefore, in the right-angled triangle ABC, all the angles and the hypothenuſe AC are given; conſequently, by the fourth caſe of trigonometry, the height ſought AB will be found; as alſo (if you pleaſe) the diſtance of the ſtation C, from AB the perpendicular within the hill or inacceſſible height.

PROPOSITION XV.

Fig. 19. *From the top of a given height, to meaſure the diſtance* BC.—Let the angle BAC be obſerved by the 12th prop. of this; wherefore in the triangle ABC, right-angled at B, there is given by obſervation the angle at A; whence (by the 59th art. of Part I.) there will alſo be given the angle BCA: moreover the ſide AB (being the height of the tower) is ſuppoſed to be given. Wherefore, by the 3d caſe of trigonometry, BC, the diſtance ſought, will be found.

PROPOSITION XVI.

Fig. 20. *To meaſure the diſtance of two places* A *and* B, *of which one is acceſſible, by the graphometer.*—Let there be erected at two points A and C, ſufficiently diſtant, two viſible ſigns; then (by the 12th prop. of this Part) let the two angles BAC, BCA, be taken by the graphometer. Let the diſtance of the ſtations A and C be meaſured with a chain. Then the third angle B being known, and the ſide AC being likewiſe known; therefore, by the firſt caſe of trigonometry, the diſtance required, AB, will be found.

PROPOSITION XVII.

Fig. 21. *To meaſure by the graphometer the diſtance of two places, neither of which is acceſſible.*—Let two ſtations C and D be choſen, from each of which the places may be ſeen whoſe diſtance is ſought; let the angles ACD, ACB, BCD, and likewiſe the angles BDC, BDA, CDA, be meaſured by the graphometer; let the diſtance of the ſtations C and D be meaſured by a chain, or (if it be neceſſary) by the preceding practice. Now, in the triangle ACD, there are given two angles ACD and ADC; therefore, the third CAD is likewiſe given; moreover, the ſide CD is given; therefore, by the firſt caſe of trigonometry, the ſide AD will be found. After the ſame manner, in the triangle BCD, from all the angles and one ſide CD given, the ſide BD is found. Wherefore, in the triangle ADB, from the given ſides DA and DB, and the angle ADB contained by them, the ſide AB (the diſtance ſought) is found by the 4th caſe of trigonometry of oblique-angled triangles.

PROPOSITION XVIII.

Fig. 22 *It is required by the graphometer and quadrant to meaſure an inacceſſible height* AB, *placed ſo on a ſteep, that one can neither go near it in an horizontal plane, nor recede from it, as we ſuppoſed in the ſolution of the* 14*th prop.*—Let there be choſen any ſituation, as C, and another D; where let ſome mark be be erected: let the angles ACD and ADC be found by the graphometer; then the third angle DAC will be known. Let the ſide CD, the diſtance of the ſtations, be meaſured with a chain, and thence (by trigon.) the ſide AC will be found. Again, in the triangle ACB, right-angled at B, having found by the quadrant the angle ACB, the other angle CAB is known likewiſe: but the ſide AC in the triangle ADC is already known; therefore the height required AB will be found by the 4th caſe of right-angled triangles. If the height of the tower is wanted, the angle BCF will be found by the quadrant: which being taken from the angle ACB already known, the angle ACF will remain: but the angle FAC was known before; therefore the remaining angle AFC will be known. But the ſide AC was alſo known before; therefore, in the triangle AFC, all the angles and one of the ſides AC being known, AF, the height of the tower above the hill, will be found by trigonometry.

SCHOLIUM.

It were eaſy to add many other methods of meaſuring heights and diſtances; but if what is above be underſtood, it will be eaſy (eſpecially for one that is verſed in the elements) to contrive methods for this purpoſe, according to the occaſion: ſo that there is no need of adding any more of this ſort. We ſhall ſubjoin here a method by which the diameter of the earth may be found out.

PROPOSITION XIX.

Plate CCXVIII.

Fig. 1. *To find the diameter of the earth from one obſervation.*—Let there be choſen a high hill AB, near the ſea-ſhore, and let the obſervator on the top of it, with an exact quadrant divided into minutes and ſeconds by tranſverſe diviſions, and fitted with a teleſcope in place of the common ſights, meaſure the angle ABE contained under the right line AB, which goes to the centre, and the right line BE drawn to the ſea, a tangent to the globe at E; let there be drawn from A perpendicular to BD, the line AF meeting BE in F. Now in the right-angled triangle BAF all the angles are given, alſo the ſide AB, the height of the hill; which is to be found by ſome of the foregoing methods as exactly as poſſible; and (by trigonometry) the ſides BF and AF are found. But by cor. 36th 3. Eucl. AF is equal to FE; therefore BE will be known. Moreover, by 36th 3. Eucl. the rectangle under BA and BD is equal to the ſquare of BE. And thence by 17th 6. Eucl. as AB : BE : : BE : BD. Therefore, ſince AB and BE are already given, BD will be found by 11th 6. Eucl. or by the rule of three; and ſubtracting BA, there will remain AD the diameter of the earth ſought.

SCHOLIUM.

Many other methods might be propoſed for meaſuring the diameter of the earth. The moſt exact is that propoſed by Mr Picart of the academy of ſciences at Paris.

“Accordidg to Mr Picart, a degree of the meridian at the latitude of 49° 21′ was 57,060 French toiſes, each of which contains ſix feet of the ſame meaſure: from which it follows, that if the earth be an exact ſphere, the circumference of a great circle of it will be 123,249,600 Paris feet, and the ſemidiameter of the earth 19,615,800 feet: but the French mathematicians, who of late have examined Mr Picart's operations, aſſure us, that the degree in that latitude is 57,183 toiſes. They meaſured a degree in Lapland, in the latitude of 66° 20′, and found it of 57,438 toiſes. By comparing theſe degrees, as well as by the obſervations on pendulums, and the theory of gravity, it appears that the earth is an oblate ſpheroid; and (ſuppoſing thoſe degrees to be accurately meaſured) the axis or diameter that paſſes through the poles will be to the diameter

diameter of the equator as 177 to 178, or the earth will be 22 miles higher at the equator than at the poles. A degree has likewiſe been meaſured at the equator, and found to be conſiderably leſs than at the latitude of Paris; which confirms the oblate figure of the earth. But an account of this laſt menſuration has not been publiſhed as yet. If the earth was of an uniform denſity from the ſurface to the centre, then, according to the theory of gravity, the meridian would be an exact ellipſis, and the axis would be to the diameter of the equator as 230 to 231; and the difference of the ſemidiameter of the equator and ſemiaxis about 17 miles."

In what follows, a figure is often to be laid down on paper, like to another figure given; and becauſe this likeneſs conſiſts in the equality of their angles, and in the ſides having the ſame proportion to each other (by the definitions of the 6th of Eucl.) we are now to ſhow what methods practical geometricians uſe for making on paper an angle equal to a given angle, and how they conſtitute the ſides in the ſame proportion. For this purpoſe they make uſe of a protractor (or, when it is wanting, a line of chords), and of a line of equal parts.

PROPOSITION XX.

Fig. 2. 3. 4. 5. and 6. *To deſcribe the conſtruction and uſe of the protractor, of the line of chords, and of the line of equal parts.*—The protractor is a ſmall ſemicircle of braſs, or ſuch ſolid matter. The ſemicircumference is divided into 180 degrees. The uſe of it is, to draw angles on any plane, as on paper, or to examine the extent of angles already laid down. For this laſt purpoſe, let the ſmall point in the centre of the protractor be placed above the angular point, and let the point AB coincide with one of the ſides that contain the angle propoſed; the number of degrees cut off by the other ſide, computing on the protractor from B, will ſhow the quantity of the angle that is to be meaſured.

But if an angle is to be made of a given quantity on a given line, and at a given point of that line, let AB coincide with the given line, and let the centre A of the inſtrument be applied to that point. Then let there be a mark made at the given number of degrees; and a right line drawn from that mark to the given point, will conſtitute an angle with the given right line of the quantity required; as is manifeſt.

This is the moſt natural and eaſy method, either for examining the extent of an angle on paper, or for deſcribing on paper an angle of a given quantity.

But when there is ſcarcity of inſtruments, or becauſe a line of chords is more eaſily carried about (being deſcribed on a ruler on which there are many other lines beſides), practical geometricians frequently make uſe of it. It is made thus: let the quadrant of a circle be divided into 90 degrees (as in fig. 3.) The line CB is the chord of 90 degrees; the chord of every arc of the quadrant is transferred to this line CB, which is always marked with the number of degrees in the correſponding arc.

Note, That the chord of 60 degrees is equal to the radius, by corol. 15. 4th Eucl. If now a given angle EDF is to be meaſured by the line of chords from the centre D, with the diſtance DG (the chord of 60 degrees), deſcribe the arc GF; and let the points G and F be marked where this arc interſects the ſides of the angle. Then if the diſtance GF, applied on the line of chords from C towards B, gives (for example) 25 degrees, this ſhall be the meaſure of the angle propoſed.

When an obtuſe angle is to be meaſured with this line, let its complement to a ſemicircle be meaſured, and thence it will be known. It were eaſy to transfer to the diameter of a circle the chords of all arches to the extent of a ſemicircle; but ſuch are rarely found marked upon rules.

But now, if an angle of a given quantity, ſuppoſe of 50 degrees, is to be made at a given point M of the right line KL (fig. 5.) From the centre M, and the diſtance MN, equal to the chord of 60 degrees, deſcribe the arc QN. Take off an arc NR, whoſe chord is equal to that of 50 degrees on the line of chords; join the points M and R; and it is plain that MR ſhall contain an angle of 50 degrees with the line KL propoſed.

But ſometimes we cannot produce the ſides till they be of the length of a chord of 60 degrees on our ſcale; in which caſe it is fit to work by a circle of proportions (that is a ſector), by which an arc may be made of a given number of degrees to any radius.

The quantities of angles are likewiſe determined by other lines uſually marked upon rules, as the lines of ſines, tangents, and ſecants; but as theſe methods are not ſo eaſy or ſo proper in this place, we omit them.

To delineate figures ſimilar or like to others given, beſides the equality of the angles, the ſame proportion is to be preſerved among the ſides of the figure that is to be delineated, as is among the ſides of the figure given. For which purpoſe, on the rules uſed by artiſts, there is a line divided into equal parts, more or leſs in number, and greater or leſs in quantity according to the pleaſure of the maker.

A foot is divided into inches; and an inch, by means of tranſverſe lines, into 100 equal parts; ſo that with this ſcale, any number of inches below 12, with any part of an inch, can be taken by the compaſſes, providing ſuch part be greater than the 100th part of an inch. And this exactneſs is very neceſſary in delineating the plans of houſes, and in other caſes.

PROPOSITION XXI.

Fig. 7. *To lay down on paper, by the protractor or line of chords, and line of equal parts, a right lined figure like to one given, providing the angles and ſides of the figure given be known by obſervation or menſuration.* For example, ſuppoſe that it is known that in a quadrangular figure, one ſide is of 235 feet, that the angle contained by it and the ſecond ſide is of 85°, the ſecond ſide of 288 feet, the angle contained by it and the third ſide of 72°, and that the third ſide is 294 feet. Theſe things being given, a figure is to be drawn on paper like to this quadrangular figure. On your paper at a proper point A, let a right line be drawn, upon which take 235 equal parts, as AB. The part repreſenting a foot is taken greater or leſs, according as you would have your figure greater or leſs. In the adjoining figure, the 100th part of an inch is taken for a foot. And accordingly an inch divided into 100 parts, and annexed to the figure, is called a ſcale of 100 feet. Let there be made at the point B (by the preceding propoſition) an angle ABC of 85°, and let BC be taken of 288 parts like to the former. Then let the angle BCD be made of 72°, and the ſide CD

of 294 equal parts. Then let the ſide AD be drawn; and it will complete the figure like to the given one. The meaſures of the angles A and D can be known by the protractor or line of chords, and the ſide AD by the line of equal parts; which will exactly anſwer to the correſponding angles and to the ſide of the primary figure.

After the very ſame manner, from the ſides and angles given which bound any right-lined figure, a figure like to it may be drawn, and the reſt of its ſides and angles be known.

COROLLARY.

Hence any trigonometrical problem in right-lined triangles may be reſolved by delineating the triangle from what is given concerning it, as in this propoſition. The unknown ſides are examined by a line of equal parts, and the angles by a protractor or line of chords.

PROPOSITION XXII.

The diameter of a circle being given, to find its circumference nearly.—The periphery of any polygon inſcribed in the circle is leſs than the circumference, and the periphery of any polygon deſcribed about a circle is greater than the circumference. Whence Archimedes firſt diſcovered that the diameter was in proportion to the circumference, as 7 to 22 nearly; which ſerves for common uſe. But the moderns have computed the proportion of the diameter to the circumference to greater exactneſs. Suppoſing the diameter 100, the periphery will be more than 314, but leſs than 315. The diameter is more nearly to the circumference, as 113 to 355. But Ludolphus van Cuelen exceeded the labours of all; for by immenſe ſtudy he found, that ſuppoſing the diameter 100,000,000,000,000,000,000,000,000,000,000, the periphery will be leſs than
314,159,265,358,979,323,846,264,338,327,951;
but greater than
314,159,265,358,979,323,846,264,338,327,950;
whence it will be eaſy, any part of the circumference being given in degrees and minutes, to aſſign it in parts of the diameter.

CHAP. II. *Of Surveying and Meaſuring of* LAND.

HITHERTO we have treated of the meaſuring of angles and ſides, whence it is abundantly eaſy to lay down a field, a plane, or an entire country; for to this nothing is requiſite but the protraction of triangles, and of other plain figures, after having meaſured their ſides and angles. But as this is eſteemed an important part of practical geometry, we ſhall ſubjoin here an account of it with all poſſible brevity; ſuggeſting withal, that a ſurveyor will improve himſelf more by one day's practice than by a great deal of reading.

PROPOSITION XXIII.

To explain what ſurveying is, and what inſtruments Surveyors uſe.—Firſt, it is neceſſary that the ſurveyor view the field that is to be meaſured, and inveſtigate its ſides and angles, by means of an iron chain (having a particular mark at each foot of length, or at any number of feet, as may be moſt convenient for reducing lines or ſurfaces to the received meaſures), and the graphometer deſcribed above. Secondly, It is neceſſary to delineate the field *in plano*, or to form a map of it; that is, to lay down on paper a figure ſimilar to the field; which is done by the protractor (or line of chords) and the line of equal parts. Thirdly, It is neceſſary to find out the area of the field ſo ſurveyed and repreſented by a map. Of this laſt we are to treat below.

The ſides and angles of ſmall fields are ſurveyed by the help of a plain-table: which is generally of an oblong rectangular figure, and ſupported by a *fulcrum*, ſo as to turn every way by means of a ball and ſocket. It has a moveable frame, which ſurrounds the board, and ſerves to keep a clean paper put on the board cloſe and right to it. The ſides of the frame facing the paper are divided into equal parts every way. The board hath beſides a box with a magnetic needle, and moreover a large index with two ſights. On the edge of the frame of the board are marked degrees and minutes, ſo as to ſupply the room of a graphometer.

PROPOSITION XXIV.

FIG. 8. *To delineate a field by the help of a plain-table, from one ſtation whence all its angles may be ſeen and their diſtances meaſured by a chain.*—Let the field that is to be laid down be ABCDE. At any convenient place F, let the plain-table be erected; cover it with clean paper, in which let ſome point near the middle repreſent the ſtation. Then applying at this place the index with the ſights, direct it ſo as that through the ſights ſome mark may be ſeen at one of the angles, ſuppoſe A; and from the point F, repreſenting the ſtation, draw a feint right line along the ſide of the index: then, by the help of the chain, let FA the diſtance of the ſtation from the foreſaid angle be meaſured. Then taking what part you think convenient for a foot or pace from the line of equal parts, ſet off on the feint line the parts correſponding to the line FA that was meaſured; and let there be a mark made repreſenting the angle of the field A. Keeping the table immoveable, the ſame is to be done with the reſt of the angles; then right lines joining thoſe marks ſhall include a figure like to the field, as is evident from 5, 6. Eucl.

COROLLARY.

The ſame thing is done in like manner by the graphometer: for having obſerved in each of the triangles, AFB, BFC, CFD, &c. the angle at the ſtation F, and having meaſured the lines from the ſtation to the angles of the field, let ſimilar triangles be protracted on paper (by the 21. prop. of this), having their common vertex in the point of ſtation. All the lines, excepting thoſe which repreſent the ſides of the field, are to be drawn faint or obſcure.

Note 1. When a ſurveyor wants to lay down a field, let him place diſtinctly in a regiſter all the obſervations of the angles, and the meaſures of the ſides, until, at time and place convenient, he draw out the figure on paper.

Note 2. The obſervations made by the help of the graphometer are to be examined: for all the angles about the point F ought to be equal to four right ones. (by cor. 2. art. 30. of Part I.)

PROPOSITION XXV.

FIG. 9. *To lay down a field by means of two ſtations, from each of which all the angles can be ſeen, by meaſuring only the diſtance of the ſtations.*—Let the inſtrument be placed at the ſtation F: and having choſen a

a point repreſenting it upon the paper which is laid upon the plain table, let the index be applied at this point, ſo as to be moveable about it. Then let it be directed ſucceſſively to the ſeveral angles of the field: and when any angle is ſeen through the ſights, draw an obſcure line along the ſide of the index. Let the index, with the ſights, be directed after the ſame manner to the ſtation G: on the obſcure line drawn along its ſide, pointing to A, ſet off from the ſcale of equal parts a line correſponding to the meaſured diſtance of the ſtations, and this will determine the point G. Then remove the inſtrument to the ſtation G, and applying the index to the line repreſenting the diſtance of the ſtations, place the inſtrument ſo that the firſt ſtation may be ſeen through the ſights. Then the inſtrument remaining immoveable, let the index be applied to the point repreſenting the ſecond ſtation G, and be ſucceſſively directed by means of its ſights to all the angles of the field, drawing (as before) obſcure lines: and the interſection of the two obſcure lines that were drawn to the ſame angle from the two ſtations will always repreſent that angle on the plan. Care muſt be taken that thoſe lines be not miſtaken for one another. Lines joining thoſe interſections will form a figure on the paper like to the field.

SCHOLIUM.

It will not be difficult to do the ſame by the graphometer, if you keep a diſtinct account of your obſervations of the angles made by the line joining the ſtations, and the lines drawn from the ſtations to the reſpective angles of the field. And this is the moſt common manner of laying down whole countries. The tops of two mountains are taken for two ſtations, and their diſtance is either meaſured by ſome of the methods mentioned above, or is taken according to common repute. The ſights are ſucceſſively directed towards cities, churches, villages, forts, lakes, turnings of rivers, woods, &c.

Note, The diſtance of the ſtations ought to be great enough, with reſpect to the field that is to be meaſured; ſuch ought to be choſen as are not in a line with any angle of the field. And care ought to be taken likewiſe that the angles, for example, FAG, FDG, &c. be neither very acute, nor very obtuſe. Such angles are to be avoided as much as poſſible; and this admonition is found very uſeful in practice.

PROPOSITION XXVI.

Fig. 10. *To lay down any field, however irregular its figure may be, by the help of the graphometer.*—Let ABCEDHG be ſuch a field. Let its angles (in going round it) be obſerved with a graphometer (by the 12. of this) and noted down; let its ſides be meaſured with a chain; and (by what was ſaid on the 21. of this) let a figure like to the given field be protracted on paper. If any mountain is in the circumference, the horizontal line hid under it is to be taken for a ſide, which may be found by two or three obſervations according to ſome of the methods deſcribed above; and its place on the map is to be diſtinguiſhed by a ſhade, that it may be known a mountain is there.

If not only the circumference of the field is to be laid down on the plan, but alſo its contents, as villages, gardens, churches, public roads, we muſt proceed in this manner.

Let there be (for example) a church F, to be laid down in the plan. Let the angles ABF BAF be obſerved and protracted on paper in their proper places, the interſection of the two ſides BF and AF will give the place of the church on the paper: or, more exactly, the lines BF AF being meaſured, let circles be deſcribed from the centres B and A, with parts from the ſcale correſponding to the diſtances BF and AF, and the place of the church will be at their interſection.

Note 1: While the angles obſerved by the graphometer are taken down, you muſt be careful to diſtinguiſh the external angles, as E and G, that they may be rightly protracted afterwards on paper.

Note 2. Our obſervations of the angles may be examined by computing if all the internal angles make twice as many right angles, four excepted, as there are ſides of the figure; (for this is demonſtrated by 32, 1. Eucl.) But in place of any external angle DEC, its complement to a circle is to be taken.

PROPOSITION XXVII.

Fig. 11. *To lay down a plain field without inſtruments.*—If a ſmall field is to be meaſured, and a map of it to be made, and you are not provided with inſtruments; let it be ſuppoſed to be divided into triangles, by right-lines, as in the figure; and after meaſuring the three ſides of any of the triangles, for example of ABC, let its ſides be laid down from a convenient ſcale on paper, (by the 22. of this.) Again, let the other two ſides BD CD of the triangle CBD be meaſured and protracted on the paper by the ſame ſcale as before. In the ſame manner proceed with the reſt of the triangles of which the field is compoſed, and the map of the field will be perfected; for the three ſides of a triangle determine the triangle; whence each triangle on the paper is ſimilar to its correſpondent triangle in the field, and is ſimilarly ſituated; conſequently the whole figure is like to the whole field.

SCHOLIUM.

If the field be ſmall, and all its angles may be ſeen from one ſtation, it may be very well laid down by the plain-table, (by the 24. of this.) If the field be larger, and have the requiſite conditions, and great exactneſs is not expected, it likewiſe may be plotted by means of the plain-table, or by the graphometer (according to the 25. of this); but in fields that are irregular and mountainous, when an exact map is required, we are to make uſe of the graphometer (as in the 26. of this), but rarely of the plain-table.

Having protracted the bounding lines, the particular parts contained within them may be laid down by the proper operations for this purpoſe (delivered in the 26th propoſition; and the method deſcribed in the 27th propoſition may be ſometimes of ſervice); for we may truſt more to the meaſuring of ſides than to the obſerving of angles. We are not to compute four-ſided and many-ſided figures till they are reſolved into triangles: for the ſides do not determine thoſe figures.

In the laying down of cities, or the like, we may make uſe of any of the methods deſcribed above that may be moſt convenient.

The map being finiſhed, it is transferred on clean paper, by putting the firſt ſketch above it, and marking the angles by the point of a ſmall needle. Theſe points being joined by right lines, and the whole illuminated

GEOMETRY. No IV.

Plate CCXVIII.

Sisson's Theodolite

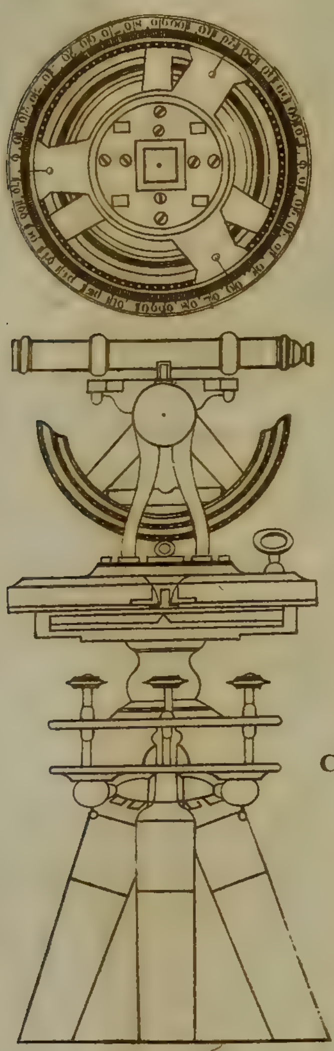
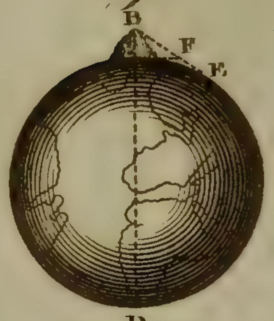


Fig 1.



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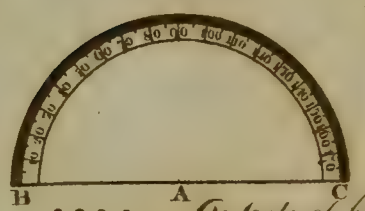

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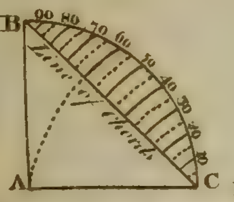

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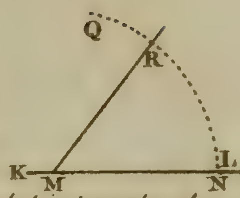

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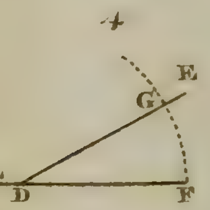
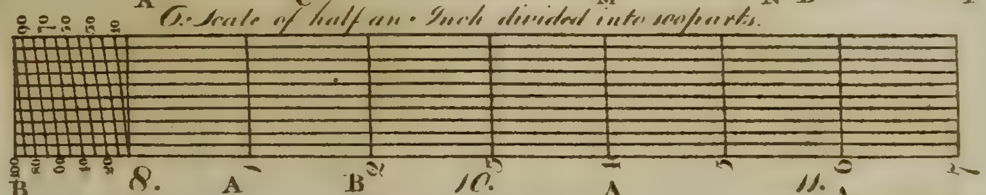


6. Scale of half an Inch divided into 100 parts.



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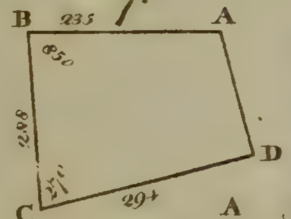

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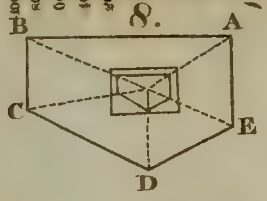

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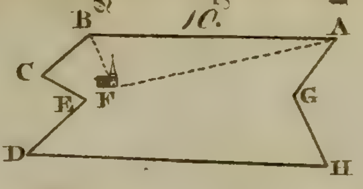

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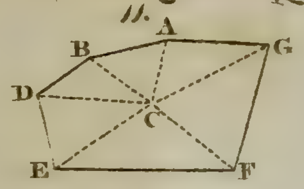

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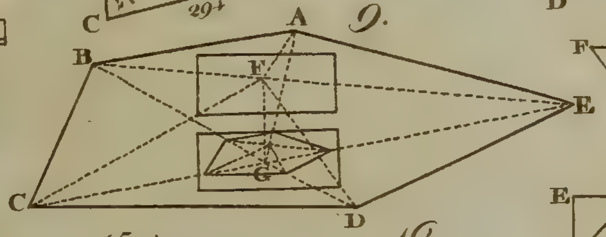

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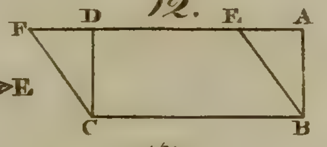

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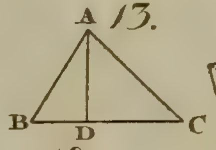

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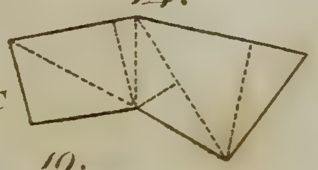

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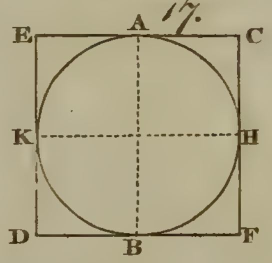

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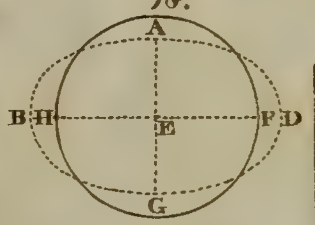

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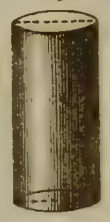

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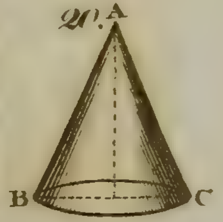

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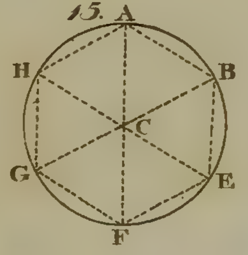

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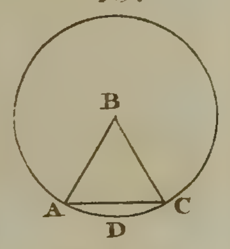

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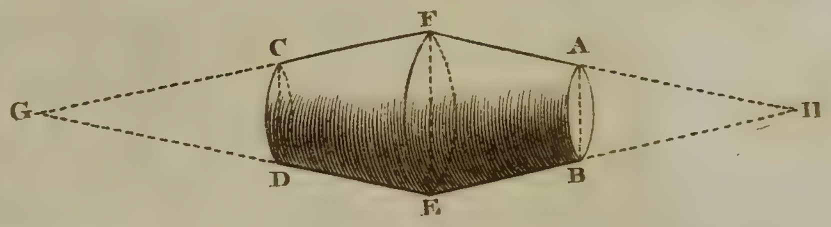

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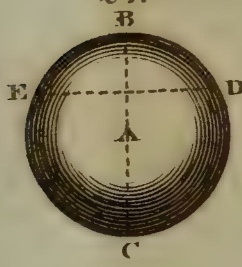

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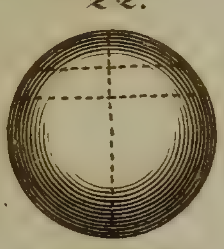

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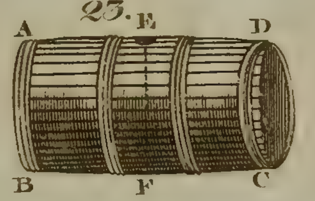

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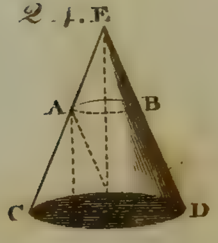

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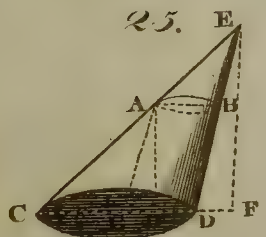

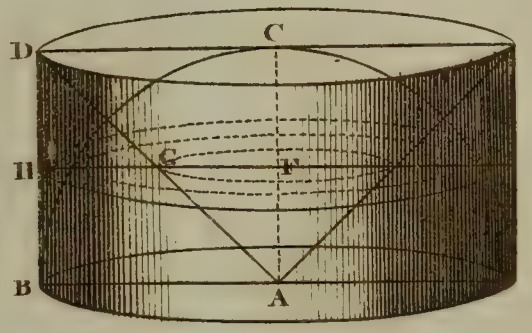

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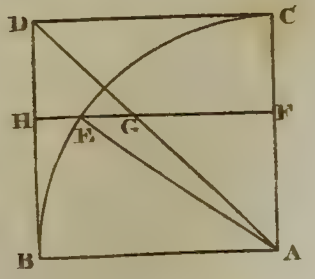

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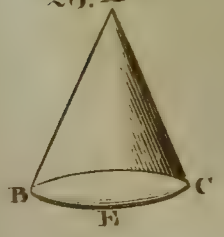

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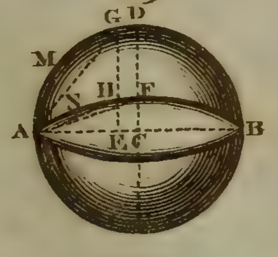

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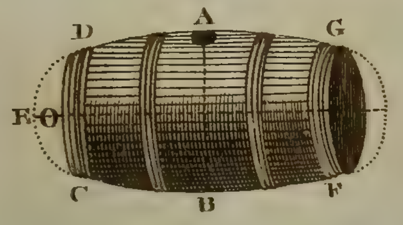

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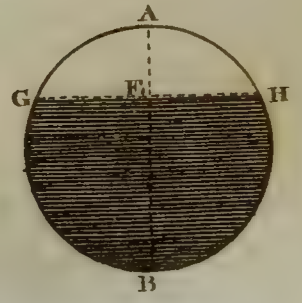

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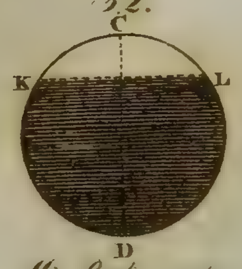

W. Barker sculp.

minated by colours proper to each part, and the figure of the mariner's compaſs being added to diſtinguiſh the north and ſouth, with a ſcale on the margin, the map or plan will be finiſhed and neat.

We have thus briefly and plainly treated of ſurveying, and ſhown by what inſtruments it is performed; having avoided thoſe methods which depend on the magnetic needle, not only becauſe its direction may vary in different places of a field (the contrary of this at leaſt doth not appear,) but becauſe the quantity of an angle obſerved by it cannot be exactly known; for an error of two or three degrees can ſcarcely be avoided in taking angles by it.

As for the remaining part of ſurveying, whereby the area of a field already laid down on paper is found in acres, roods, or any other ſuperficial meaſures; this we leave to the following ſection, which treats of the menſuration of ſurfaces.

“ Beſides the inſtruments deſcribed above, a ſurveyor ought to be provided with an off-ſet ſtaff equal in length to 10 links of the chain, and divided into 10 equal parts. He ought likewiſe to have 10 arrows or ſmall ſtraight ſticks near two feet long, ſhod with iron ferrils. When the chain is firſt opened, it ought to be examined by the off-ſet ſtaff. In meaſuring any line, the leader of the chain is to have the 10 arrows at firſt ſetting out. When the chain is ſtretched in the line, and the near end touches the place from which you meaſure, the leader ſtrikes one of the 10 arrows in the ground, at the far end of the chain. Then the leader leaving the arrow, proceeds with the chain another length: and the chain being ſtretched in the line, ſo that the near end touches the firſt arrow, the leader ſticks down another arrow at his end of the chain. The line is preſerved ſtraight, if the arrows, be always ſet ſo as to be in a right line with the place you meaſure from, and that to which you are going. In this manner they proceed till the leader have no more arrows. At the eleventh chain, the arrows are to be carried to him again, and he is to ſtick one of them into the ground, at the end of the chain. And the ſame is to be done at the 21. 31. 41. &c. chains, if there are ſo many in a right line to be meaſured. In this manner you can hardly commit an error in numbering the chains, unleſs of 10 chains at once.

The off-ſet ſtaff ſerves for meaſuring readily the diſtances of any things proper to be repreſented in your plan, from the ſtation-line, while you go along. Theſe diſtances ought to be entered into your field-book, with the correſponding diſtances from the laſt ſtation, and proper remarks, that you may be enabled to plot them juſtly, and be in no danger of miſtaking one for another when you extend your plan. The field-book may be conveniently divided into five columns. In the middle column the angles at the ſeveral ſtations taken by the theodolite are to be entered, with the diſtances from the ſtations. The diſtances taken by the off-ſet ſtaff, on either ſide of the ſtation-line, are to be entered into columns on either ſide of the middle column, according to their poſition with reſpect to that line. The names and characters of the objects, with proper remarks, may be entered in columns on either ſide of theſe laſt.

“ Becauſe, in the place of the graphometer deſcribed by our author, ſurveyors now make uſe of the theodolite, we ſhall ſubjoin a diſcription of Mr Siſſon's lateſt improved theodolite from Mr Gardner's practical ſurveying improved. See a figure of it in Plate CCXVIII.

“ In this inſtrument, the three ſtaffs, by braſs ferrils at top, ſcrew into bell-metal joints, that are moveable between braſs pillars, fixed in a ſtrong braſs plate; in which, round the centre, is fixed a ſocket with a ball moveable in it, and upon which the four ſcrews preſs, that ſet the limb horizontal: Next above is another ſuch plate, through which the ſaid ſcrews paſs, and on which, round the centre, is fixed a fruſtum of a cone of bell-metal, whoſe axis (being connected with the centre of the bell) is always perpendicular to the limb, by mean of a conical braſs ferril fitted to it, whereon is fixed the compaſs-box; and on it the limb, which is a ſtrong bell-metal ring, whereon are moveable three braſs indexes, in whoſe plate are fixed four braſs pillars, that, joining at top, hold the centre pin of the bell-metal double ſextant, whoſe double index is fixed on the centre of the ſame plate: Within the double ſextant is fixed the ſpirit level, and over it the teleſcope.

“ The compaſs-box is graved with two diamonds for the north and ſouth, and with 20 degrees on both ſides of each, that the needle may be ſet to the variation, and its error alſo known.

“ The limb has two *fleurs de luce* againſt the diamonds in the box, inſtead of 180 each, and is curiouſly divided into whole degrees, and numbered to the left hand at every 10 to twice 180, having three indexes diſtant 120 (with Nonius's diviſions on each for the decimals of a degree), that are moved by a pinion fixed below one of them, without moving the limb; and in another is a ſcrew and ſpring under, to fix it to any part of the limb. It has alſo diviſions numbered, for taking the quarter girt in inches of round timber at the middle height, when ſtanding 10 feet horizontally diſtant from its centre; which at 20 muſt be doubled, and at 30 tripled; to which a ſhorter index is uſed, having Nonius's diviſions for the decimals of an inch; but an abatement muſt be made for the bark, if not taken off.

“ The double ſextant is divided on one ſide from under its centre (when the ſpirit-tube and teleſcope are level) to above 60 degrees each way and numbered at 10, 20, &c. and the double index (through which it is moveable) ſhows on the ſame ſide the degree and decimal of any altitude or depreſſion to that extent by Nonius's diviſions: On the other ſide are diviſions numbered, for taking the upright height of timber, &c. in feet, when diſtant 10 feet: which at 20 muſt be doubled, and at 30 tripled; and alſo the quantities for reducing hypothenuſal lines to horizontal. It is moveable by a pinion fixed in the double index.

“ The teleſcope is a little ſhorter than the diameter of the limb, that a fall may not hurt it; yet it will magnify as much, and ſhow a diſtant object as perfect as moſt of triple its length. In its focus are very fine croſs wires, whoſe interſection is in the plane of the double ſextant; and this was a whole circle, and turned in a lathe to a true plane, and is fixed at right angles to the limb; ſo that, whenever the limb is ſet horizontal (which is readily done by making the ſpirit-tube level over two ſcrews, and the like over the other two), the double ſextant and teleſcope are moveable in a vertical plane; and then every angle taken on the limb (though the teleſcope be never ſo much elevated or depreſſed) will be an angle in the plane of the horizon. And this is abſolutely neceſſary in plotting a horizontal plane.

"If the lands to be plotted are hilly, and not in any one plane, the lines meaſured cannot be truly laid down on paper, without being reduced to one plane, which muſt be the horizontal, becauſe angles are taken in that plane.—

"In viewing your objects, if they have much altitude or depreſſion, either write down the degree and decimal ſhown on the double ſextant, or the links ſhown on the back ſide; which laſt ſubſtracted from every chain in the ſtation-line, leaves the length in the horizontal plane. But if the degree is taken, the following table will ſhow the quantity.

A Table of the links to be ſubtracted out of every chain in hypothenuſal lines of ſeveral degrees altitude, or depreſſion for reducing them to horizontal.

Degrees.	*Links.*	*Degrees.*	*Links.*	*Degrees.*	*Links.*
4,05 ——	$\frac{1}{4}$	14,07 ——	3	23,074 ——	8
5,73 ——	$\frac{1}{2}$	16,26 ——	4	24,495 ——	9
7,02 ——	$\frac{3}{4}$	18,195 ——	5	25,84 ——	10
8,11 ——	1	19,95 ——	6	27,13 ——	11
11,48 ——	2	21,565 ——	7	28,36 ——	12

"Let the firſt ſtation line really meaſure 1107 links, and the angle of altitude or depreſſion be 19°, 95; looking in the table you will find againſt 19°, 95, is 6 links. Now 6 times 11 is 66, which ſubtracted from 1107, leaves 1041, the true length to be laid down in the plan.

It is uſeful in ſurveying, to take the angles, which the bounding lines form, with the magnetic needle, in order to check the angles of the figure, and to plot them conveniently afterwards."

Chap. III. *Of the Surfaces of Bodies.*

The ſmalleſt ſuperficial meaſure in Scotland is a ſquare inch; 144 of which make a ſquare foot. Wrights make uſe of theſe in the meaſuring of deals and planks; but the ſquare foot which the glaziers uſe in meaſuring of glaſs, conſiſts only of 64 ſquare inches. The other meaſures are, firſt, the ell ſquare; ſecondly, the fall containing 36 ſquare ells; thirdly, the rood containing 40 falls; fourthly, the acre, containing 4 roods. Slaters, maſons, and pavers, uſe the ell ſquare and the fall; ſurveyors of land uſe the ſquare ell, the fall, the rood and the acre.

The ſuperficial meaſures of the Engliſh are, firſt, the ſquare foot; ſecondly, the ſquare yard, containing 9 ſquare feet, for their yard contains only 3 feet; thirdly, the pole containing $30\frac{1}{4}$ ſquare yards; fourthly, the rood containing 40 poles; fifthly, the acre, containing 4 roods. And hence it is eaſy to reduce Scoch ſuperficial meaſures to the Engliſh,.

"In order to find the content of a field, it is moſt convenient to meaſure the lines by the chains deſcribed above, p. 671. that of 22 yards for computing the Engliſh acres, and that of 24 Scots ells for the acres of Scotland. The chain is divided into 100 links, and the ſquare of the chain is 10,000 ſquare links; 10 ſquares of the chain, or 100,000 ſquare links, give an acre. Therefore if the area be expreſſed by ſquare links, divide by 100,000, or cut off five decimal places and the quotient ſhall give the area in acres and decimals of an acre. Write the entire acres apart: but multiply the decimals of an acre by 4, and the product ſhall give the remainder of the area in roods and decimals of a rood. Let the entire roods be noted apart after the acres; then multiply the decimals of a rood by 40, and the product ſhall give the remainder of the area in falls or poles. Let the entire falls or poles be then writ after the roods, and multiply the decimals of a fall by 36, if the area is required in the meaſures of Scotland; but multiply the decimals of a pole by $30\frac{1}{4}$, if the area is required in the meaſures of England, and the product ſhall give the remainder of the area in ſquare ells in the former caſe, but in ſquare yards in the latter. If, in the former caſe, you would reduce the decimals of the ſquare ell to ſquare feet, multiply them by 9.50694; but, in the latter caſe, the decimals of the Engliſh ſquare yard are reduced to ſquare feet, by multiplying them by 9.

"Supppoſe, for example, that the area appears to contain 1265842 ſquare links of the chain of 24 ells; and that this area is to be expreſſed in acres, roods, falls, &c. of the meaſures of Scotland. Divide the ſquare links by 100,000, and the quotient 12.65842 ſhows the area to contain 12 acres $\frac{65842}{100000}$ of an an acre. Multiply the decimal part by 4, and the product 2.63368 gives the remainder in roods and decimals of a rood. Thoſe decimals of the rood being multiplied by 40, the product gives 25.3472 falls. Multiply the decimals of the fall by 36, and the product gives 12.4992 ſquare ells. The decimals of the ſquare ell multiplied by 9.50994 give 4.7458 ſquare feet. Therefore the area propoſed amounts to 12 acres, 2 roods, 25 falls, 12 ſquare ells, and $4\frac{7458}{10000}$ ſquare feet.

"But if the area contains the ſame number of ſquare links of Gunter's chain, and is to be expreſſed by Engliſh meaſures, the acres and roods are computed in the ſame manner as in the former caſe. The poles are computed as the falls. But the decimals of the pole, *viz.* $\frac{3472}{10000}$, are to be multiplied by $30\frac{1}{4}$ (or 30 25), and the product gives 10.5028 ſquare yards. The decimals of the ſquare yard, multiplied by 9, give 4.5252 ſquare feet; therefore, in this caſe, the area is in Engliſh meaſure 12 acres, 2 roods, 25 poles, 10 ſquare yards, and $4\frac{5252}{10000}$ ſquare feet.

"The Scots acre is to the Engliſh acre, by ſtatute, as 100,000 to 78,694, if we have regard to the difference betwixt the Scots and Engliſh foot abovementioned. But it is cuſtomary in ſome parts of England to have 18.21, &c. feet to a pole, and 160 ſuch poles to an acre; whereas, by the ſtatute, $16\frac{1}{2}$ feet make a pole. In ſuch caſes the acre is greater in the duplicate ratio of the number of feet to a pole.

"They who meaſure land in Scotland by an ell of 37 Engliſh inches, make the acre leſs than the true Scots acre by $593\frac{6}{10}$ ſquare Engliſh feet, or by about $\frac{1}{93}$ of the acre.

"An huſband land contains 6 acres of ſock and ſcythe-land, that is, of land that may be tilled with a plough, and mown with a ſcythe; 13 acres of arable land make an oxgang or oxengate; four oxengate make a pound land of old extent (by a decree of the Exchequer, March 11. 1585), and is called *librata terræ*. A forty-ſhilling land of old extent contains 8 oxgang, or 104 acres.

" The arpent, about Paris, contains 32,400 ſquare Paris feet, and is equal to $2\frac{1}{2}$ Scots roods, or $3\frac{37}{100}$ Engliſh roods.

" The *actus quadratus*, according to Varro, Collumella, &c. was a ſquare of 120 Roman feet. The *jugerum* was the double of this. It is to the Scots acre as 10,000 to 20,456, and to the Engliſh acre as 10,000, to 16,097. It was divided (like the *as*) into 12 *unciæ*, and the *uncia* into 24 *ſcrupula*."—This, with the three preceding paragraphs, are taken from an ingenious manuſcript, written by Sir Robert Stewart profeſſor of natural philoſophy. The greateſt part of the table in p. 671. was taken from it likewiſe.

PROPOSITION XXVIII.

Fig. 12. *To find out the area of a rectangular parallelogram* ABCD.—Let the ſide AB, for example, be 5 feet long, and BC (which conſtitutes with BA a right angle at B) be 17 feet. Let 17 be multiplied by 5, and the product 85 will be the number of ſquare feet in the area of the figure ABCD. But if the parallelogram propoſed is not rectangular as BEFC, its baſe BC multiplied into its perpendicular height AB (not into its ſide BE) will give its area. This is evident from art. 68. of Part I.

PROPOSITION XXIX

Fig. 13. *To find the area of a given triangle.*—Let the triangle BAC be given, whoſe baſe BC is ſuppoſed 9 feet long: let the perpendicular AD be drawn from the angle A oppoſite to the baſe, and let us ſuppoſe AD to be 4 feet. Let the half of the perpendicular be multiplied into the baſe, or the half of the baſe into the perpendicular, or take the half of the product of the whole baſe into the perpendicular, the product gives 18 ſquare feet for the area of the given triangle.

But if only the ſides are given, the perpendicular is found either by protracting the triangle, or by 12th and 13th 2. Eucl. or by trigonometry. But how the area of a triangle may be found from the given ſides only, ſhall be ſhown in the 31ſt propoſition.

PROPOSITION XXX.

Fig. 14. *To find the area of any rectilineal figure.*—If the figure be irregular, let it be reſolved into triangles; and drawing perpendiculars to the baſes in each of them, let the area of each triangle be found by the preceding propoſition, and the ſum of theſe areas will give the area of the figure.

SCHOLIUM 1.

In meaſuring boards, planks, and glaſs, their ſides are to be meaſured by a foot-rule divided into 100 equal parts; and after multiplying the ſides, the decimal fractions are eaſily reduced to leſſer denominations. The menſuration of theſe is eaſy, when they are rectangular parallelograms.

SCHOLIUM 2.

If a field is to be meaſured, let it firſt be plotted on paper, by ſome of the methods above deſcribed, and let the figure ſo laid down be divided into triangles, as was ſhown in the preceding propoſition.

The baſe of any triangle, or the perpendicular upon the baſe, or the diſtance of any two points of the field, is meaſured by applying it to the ſcale according to which the map is drawn.

SCHOLIUM 3.

But if the field given be not in an horizontal plane, but uneven and mountainous, the ſcale gives the horizontal line between any two points, but not their diſtance meaſured on the uneven ſurface of the field. And indeed it would appear, that the horizontal plane is to be accounted the area of an uneven and hilly country. For if ſuch ground is laid out for building on, or for planting with trees, or bearing corn, ſince theſe ſtand perpendicular to the horizon, it is plain, that a mountainous country cannot be conſidered as of greater extent for thoſe uſes than the horizontal plane; nay, perhaps, for nouriſhing of plants, the horizontal plane may be preferable.

If, however, the area of a figure, as it lies regularly on the ſurface of the earth, is to be meaſured, this may be eaſily done by reſolving it into triangles as it lies. The ſum of their areas will be the area ſought; which exceeds the area of the horizontal figure more or leſs, according as the field is more or leſs uneven.

PROPOSITION XXXI.

Fig. 13. *The ſides of a triangle being given, to find the area, without finding the perpendicular.*—Let all the ſides of the triangle be collected into one ſum; from the half of which let the ſides be ſeparately ſubtracted, that three differences may be found betwixt the foreſaid half ſum and each ſide; then let theſe three differences and the half ſum be multiplied into one another, and the ſquare root of the product will give the area of the triangle. For example, let the ſides be 10, 17, 21; the half of their ſum is 24; the three differences betwixt this half ſum and the three ſides, are 14, 7, and 3. The firſt being multiplied by the ſecond, and their product by the third, we have 294 for the product of the differences; which multiplied by the foreſaid half ſum 24, gives 7056; the ſquare root of which 84 is the area of the triangle. The demonſtration of this, for the ſake of brevity, we omit. It is to be found in ſeveral treatiſes, particularly in Clavius's Practice of Geometry.

PROPOSITION XXXII.

Fig. 15. *The area of the ordinate figure* ABEFGH *is equal to the product of the half circumference of the polygon, multiplied into the perpendicular drawn from the centre of the circumſcribed circle to the ſide of the polygon.*—For the ordinate figure can be reſolved into as many equal triangles as there are ſides of the figure; and ſince each trangle is equal to the product of half the baſe into the perpendicular, it is evident that the ſum of all the triangles together, that is the polygon, is equal to the product of half the ſum of the baſes (that is the half of the circumference of the polygon) into the common perpendicular height of the triangles drawn from the centre C to one of the ſides; for example, to AB.

PROPOSITION XXXIII.

Fig. 16. *The area of a circle is found by multiplying the half of the periphery into the radius, or the half of the radius into the periphery.*—For a circle is not different from an ordinate or regular polygon of an infinite number of ſides, and the common height of the triangles into

to which the polygon or circle may be ſuppoſed to be divided is the radius of the circle.

Were it worth while, it were eaſy to demonſtrate accurately this propoſition, by means of the inſcribed and circumſcribed figures, as is done in the 4th prop. of the treatiſe of Archimedes concerning the dimenſions of the circle.

COROLLARY.

Hence alſo it appears, that the area of the ſector ABCD is produced by multiplying the half of the arc into the radius, and likewiſe that the area of the ſegment of the circle ADC is found by ſubtracting from the area of the ſector the area of the triangle ABC.

PROPOSITION XXXIV.

Fig. 17. *The circle is to the ſquare of the diameter as* 11 *to* 14 *nearly.*—For if the diameter AB be ſuppoſed to be 7, the circumference AHBK will be almoſt 22 (by the 22d prop. of this Part), and the area of the ſquare DC will be 49; and, by the preceding prop. the area of the circle will be $28\frac{1}{2}$: therefore the ſquare DC will be to the inſcribed circle as 49 to $38\frac{1}{2}$, or as 98 to 77, that is, as 14 to 11. *Q. E. D.*

If greater exactneſs is required, you may proceed to any degree of accuracy: for the ſquare DC is to the inſcribed circle, as 1 to $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\frac{2}{9}-\frac{2}{11}+\frac{1}{13}$, *&c. in infinitum.*

“ This ſeries will be of no ſervice for computing the area of the circle accurately, without ſome further artifice, becauſe it converges at too ſlow a rate. The area of the circle will be found exactly enough for moſt purpoſes, by multiplying the ſquare of the diameter by 7854, and dividing by 10,000, or cutting off four decimal places from the product; for the area of the circle is to the circumſcribed ſquare nearly as 7854 to 10,000.”

PROPOSITION XXXV.

Fig. 18. *To find the area of a given ellipſe.*—Let ABCD be an ellipſe, whoſe greater diameter is BD, and the leſſer AC, biſecting the greater perpendicularly in E. Let a mean proportional HF be found (by 13th 6. Eucl.) between AC and BD, and (by the 33d of this) find the area of the circle deſcribed on the diameter HF. This area is equal to the area of the ellipſe ABCD. For becauſe, as BD to AC, ſo the ſquare of BD to the ſquare of HF, (by 2. cor. 20th 6. Eucl.): but (by the 2d 12. Eucl.) as the ſquare of BD to the ſquare of HF, ſo is the circle of the diameter BD, to the circle of the diameter HF: therefore as BD to AC, ſo is the circle of the diameter BD, to the circle of the diameter HF. And (by the 5th prop. of Archimedes of ſpheroids) as the greater diameter BD, to the leſſer AC, ſo is the circle of the diameter BD, to the ellipſe ABCD. Conſequently (by the 11th 5. Eucl.) the circle of the diameter BD will have the ſame proportion to the circle of the diameter HF, and to the ellipſe ABCD. Therefore (by 9th 5. Eucl.) the area of the circle of the diameter HF will be equal to the area of the ellipſe ABC. *Q. E. D.*

SCHOLIUM.

From this and the two preceding propoſitions, a method is derived of finding the area of an ellipſe. There are two ways: 1ſt, Say, as one is to the leſſer diameter, ſo is the greater diameter to a fourth number, (which is found by the rule of three). Then again ſay, as 14 to 11, ſo is the fourth number found to the area ſought. But the ſecond way is ſhorter. Multiply the leſſer diameter into the greater, and the product by 11; then divide the whole product by 14, and the quotient will be the area ſought of the ellipſe. For example, Let the greater diameter be 10, and the leſſer 7; by multiplying 10 by 7, the product is 70; and multiplying that by 11, it is 770; and dividing 770 by 14, the quotient will be 55, which is the area of the ellipſe ſought.

“ The area of the ellipſe will be found more accurately, by multiplying the product of the two diameters by .7854.”

We ſhall add no more about other plain ſurfaces, whether rectilinear or curvilinear, which ſeldom occur in practice; but ſhall ſubjoin ſome propoſitions about meaſuring the ſurface of ſolids.

PROPOSITION XXXVI.

To meaſure the ſurface of any priſm.—By the 14th definition of the 11th Eucl. a priſm is contained by planes, of which two oppoſite ſides (commonly called the baſes) are plain rectilineal figures; which are either regular and ordinate, and meaſured by prop. 32. of this; or however irregular, and then they are meaſured by the 28th prop. The other ſides are parallelograms, which are meaſured by prop. 28th; and the whole ſuperficies of the priſm conſiſts of the ſum of thoſe taken altogether.

PROPOSITION XXXVII.

To meaſure the ſuperficies of any pyramid.—Since its baſis is a rectilineal figure, and the reſt of the planes terminating in the top of the pyramid are triangles; theſe meaſured ſeparately, and added together, give the ſurface of the pyramid required.

PROPOSITION XXXVIII.

To meaſure the ſuperficies of any regular body.—Theſe bodies are called *regular*, which are bounded by equilateral and equiangular figures. The ſuperficies of the tetraedon conſiſts of four equal and equiangular triangles; the ſuperficies of the hexaedron or cube, of ſix equal ſquares; an octaedron, of eight equal equilateral triangles; a dodecaedron, of twelve equal and ordinate pentagons; and the ſuperficies of an icoſaedron, of twenty equal and equilateral triangles. Therefore it will be eaſy to meaſure theſe ſurfaces from what has been already ſhown.

In the ſame manner we may meaſure the ſuperficies of a ſolid contained by any planes.

PROPOSITION XXXIX.

Fig. 19. *To meaſure the ſuperficies of a cylinder.*—Becauſe a cylinder differs very little from a priſm, whoſe oppoſite planes or baſes are ordinate figures of an infinite number of ſides, it appears that the ſuperficies of a cylinder, without the baſis, is equal to an infinite number of parallelograms; the common altitude of all which is the ſame with the height of the cylinder, and the baſes of them all differ very little from the periphery of the circle which is the baſe of the cylinder. Therefore this periphery multiplied into the common height, gives the ſuperficies of the cylinder, excluding the baſes; which are to be meaſured ſeparately by the 33d propoſition.

This propoſition concerning the meaſure of the ſurface of the cylinder (excluding its baſis) is evident from this, that when it is conceived to be ſpread out, it

Surface of Bodies.

it becomes a parallelogram, whoſe baſe is the periphery of the circle of the baſe of the cylinder ſtretched into a right line, and whoſe height is the ſame with the height of the cylinder.

PROPOSITION XL.

Fig. 20. *To meaſure the ſurface of a right cone.*—The ſurface of a right cone is very little different from the ſurface of a right pyramid, having an ordinate polygon for its baſe of an infinite number of ſides; the ſurface of which (excluding the baſe) is equal to the ſum of the triangles. The ſum of the baſes of theſe triangles is equal to the periphery of the circle of the baſe, and the common height of the triangles is the ſides of the cone AB; wherefore the ſum of theſe triangles is equal to the product of the ſum of the baſes (i. e. the periphery of the baſe of the cone) multiplied into the half of the common height, or it is equal to half the product of the periphery of the baſe multiplied in the ſlaunt height.

If the area of the baſe is likewiſe wanted, it is to be found ſeparately by the 33d prop. If the ſurface of a cone is ſuppoſed to be ſpread out on a plane, it will become a ſector of a circle whoſe radius is the ſide of the cone, and the arc terminating the ſector is made from the periphery of the baſe. Whence, by corol. 33d prop. of this, its dimenſion may be found.

COROLLARY.

Hence it will be eaſy to meaſure the ſurface of a *fruſtum* of a cone cut by a plane parallel to the baſe.

PROPOSITION XLI.

Fig. 21. *To meaſure the ſurface of a given ſphere.*—Let there be a ſphere whoſe center is A, and let the area of its convex ſurface be required. Archimedes demonſtrates (37th prob. 1. book of the ſphere and cylinder) that its ſurface is equal to the area of four great circles of the ſphere; that is, let the area of the great circle be multiplied by 4, and the product will give the area of the ſphere. or (by the 20th 6. and 2d 12. of Eucl.) the area of the ſphere given is equal to the area of a circle whoſe radius is the right line BC, the diameter of the ſphere. Therefore having meaſured (by 33 prop.) the circle deſcribed with the radius BC, this will give the ſurface of the ſphere.

PROPOSITION XLII.

Fig. 22. *To meaſure the ſurface of a ſegment of a ſphere.*—Let there be a ſegment cut off by the plane ED. Archimedes demonſtrates (49. and 50. 1. *De ſphera*) that the ſurface of this ſegment, excluding the circular baſe, is equal to the area of a circle whoſe radius is the right line BE drawn from the vertex B of the ſegment to the periphery of the circle DE. Therefore (by the 33d prop.) it is eaſily meaſured.

COROLLARY 1.

Hence that part of the ſurface of a ſphere that lies between two parallel planes is eaſily meaſured, by ſubtracting the ſurface of the leſſer ſegment from the ſurface of the greater ſegment,

COROLLARY 2.

Hence likewiſe it follows, that the ſurface of a cylinder, deſcribed about a ſphere (excluding the baſes) is equal to the ſurface of the ſphere, and the parts of the one to the parts of the other, intercepted between planes parallel to the baſes of the cylinder.

Gauging.

Chap. IV. *Of ſolid Figures and their Meaſuration, comprehending likewiſe the Principles of Gauging Veſſels of all Figures.*

As in the former part of this treatiſe we took an inch for the ſmalleſt meaſure in length, and an inch ſquare for the ſmalleſt ſuperficial meaſure; ſo now, in treating of the meaſuration of ſolids, we take a cubical inch for the ſmalleſt ſolid meaſure. Of theſe, 109 make a Scots pint; other liquid meaſures depend on this, as are generally known.

In dry meaſures, the Scots firlot, by ſtatute, contains $19\frac{1}{4}$ pints; and on this depend the other dry meaſures: therefore, if the content of any ſolid be given in cubical inches, it will be eaſy to reduce the ſame to the common liquid or dry meaſures, and converſely to reduce theſe to ſolid inches. The liquid and dry meaſures, in uſe among other nations, are known from their writers.

" As to the Engliſh liquid meaſures, by act of parliament 1706, any round veſſel commonly called a *cylinder*, having an even bottom, being ſeven inches in diameter throughout, and ſix inches deep from the top of the inſide to the bottom (which veſſel will be found by computation to contain $230\frac{907}{1000}$ cubical inches), or any veſſel containing 231 cubical inches, and no more, is deemed to be a lawful wine-gallon. An Engliſh pint therefore contains $28\frac{7}{8}$ cubical inches; 2 pints make a quart; 4 quarts a gallon; 18 gallons a roundlet; 3 roundlets and an half, or 63 gallons, make a hogſhead; the half of a hogſhead is a barrel: 1 hogſhead and a third, or 84 gallons, make a puncheon; 1 puncheon and a half or 2 hogſheads, or 126 gallons, makes a pipe or butt; the third part of a pipe or 42 gallons, make a tierce; 2 pipes, or 3 puncheons or 4 hogſheads, make a ton of wine. Though the Engliſh wine gallon is now fixed at 231 cubical inches, the ſtandard kept in Guildhall being meaſured, before many perſons of diſtinction, May 25. 1688, it was found to contain only 224 ſuch inches.

" In the Engliſh beer-meaſure, a gallon contains 282 cubical inches; conſequently $35\frac{1}{4}$ cubical inches make a pint, 2 pints make a quart, 4 quarts make a gallon, 9 gallons a firkin, 4 firkins a barrel. In ale, 8 gallons make a firkin, and 32 gallons make a barrel. By an act of the firſt of William and Mary, 34 gallons is the barrel, both for beer and ale, in all places, except within the weekly bill of mortality.

" In Scotland it is known that 4 gills make a mutchkin, 2 mutchkins make a chopin; a pint is two chopins; a quart is two pints; and a gallon is four quarts or eight pints. The accounts of the cubical inches contained in the Scots pint vary conſiderably from each other. According to our Author, it contains 109 cubical inches. But the ſtandard jugs kept by the dean of guild of Edinburgh (one of which has the year 1555, with the arms of Scotland, and the town of Edinburgh, marked upon it) having been carefully meaſured ſeveral times, and by different perſons, the Scots pint, according to thoſe ſtandards, was found to contain about $103\frac{4}{16}$ cubic inches. The pewterers jugs (by which the veſſels in common uſe are made) are ſaid to contain ſometimes betwixt 105 and 106 cubic inches. A caſk that was meaſured by the brewers of Edinburgh, before the commiſſioners of exciſe in 1707, was found to contain $46\frac{7}{8}$ Scots pints; the ſame veſſel contained $18\frac{1}{16}$ Engliſh ale-gallons. Suppoſing this menſuration to be juſt, the Scots pint will be to the Engliſh ale-gallon as 289 to 750; and if the Engliſh ale-gallon be ſuppoſed to contain 282 cubical inches, the Scots pint will contain 108.664 cubical inches. But it is ſuſpected, on ſeveral grounds that the experiment was not made with ſufficient care and exactneſs.

" The commiſſioners appointed by authority of parliament to ſettle the meaſures and weights, in their act of Feb. 19. 1618, relate, That having cauſed fill the Linlithgow firlot with water, they found that it contained $21\frac{1}{4}$ pints of the juſt Stirling jug and meaſure. They likewiſe ordain that this ſhall be the juſt and only firlot; and add, *That the wideneſs and broadneſs of the which firlot, under and above even over within the buirds, ſhall contain nineteen inches and the ſixth part of an inch, and the deepneſs ſeven inches and a third part of an inch.* According to this act (ſuppoſing their experiment and computation to have been accurate) the pint contained only 99.56 cubical inches; for the content of ſuch a veſſel as is deſcribed in the act, is 2115.85, and this divided by $21\frac{1}{4}$ gives 99.56. But by the weight of water ſaid to fill this firlot in the ſame act, the meaſure of the pint agrees nearly with the Edinburgh ſtandard abovementioned.

" As for the Engliſh meaſures of corn, the Wincheſter gallon contains $272\frac{1}{4}$ cubical inches; 2 gallons make a peck; 4 pecks, or 8 gallons (that is, 2178 cubical inches), make a buſhel; and a quarter is 8 buſhels.

" Our anthor ſays, that $19\frac{1}{2}$ Scots pints make a firlot. But this does not appear to be agreeable to the ſtatute abovementioned, nor to the ſtandard-jugs. It may be conjectured, that the proportion aſſigned by him has been deduced from ſome experiment of how many pints, according to common uſe, were contained in the firlot. For if we ſuppoſe thoſe pints to have been each of 108.664 cubical inches, according to the experiment made in the 1707 before the commiſſioners of exciſe deſcribed above; the $19\frac{1}{2}$ ſuch pints will amount to 2118.94, cubical inches, which agrees nearly with 2115.85, the meaſure of the firlot by ſtatute abovementioned. But it is probable, that in this he followed the act 1587, where it is ordained, That the wheat-firlot ſhall contain 19 pints and two joucattes. A wheat-firlot marked with the Linlithgow ſtamps being meaſured, was found to contain about 2211 cubical inches. By the ſtatute of 1618, the barley-firlot was to contain 31 pints of the juſt Stirling-jug.

" A Paris pint is 48 cubical Paris inches, and is nearly equal to an Engliſh wine-quart. The *Boiſſean* contains 664.68099 Paris cubical inches, or 780.36 Engliſh cubical inches.

" The Roman *amphora* was a cubical Roman foot, the *congius* was the eighth part of the *amphora*, the *ſextarius* was one ſixth of the *congius*. They divided the *ſextarius* like the *as* or *libra*. Of dry meaſures, the *medimnus* was equal to two amphoras, that is, about $1\frac{1}{2}\frac{1}{5}$ Engliſh legal buſhels; and the *modius* was the third part of the *amphora*."

PROPOSITION XLIII.

To find the ſolid content of a given priſm.—By the 29th prop. let the area of the baſe of the priſm be meaſured, and be multiplied by the height of the priſm, the product will give the ſolid content of the priſm.

PROPOSITION XLIV.

To find the ſolid content of a given pyramid.—The area of the baſe being found (by the 30th prop.), let it be multiplied by the third part of the height of the pyramid, or the third part of the baſe by the height, the product will give the ſolid content, by 17th 12. Eucl.

COROLLARY.

If the ſolid content of a *fruſtum* of a pyramid is required, firſt let the ſolid content of the entire pyramid be found; from which ſubtract the ſolid content of the part that is wanting, and the ſolid content of the broken pyramid will remain.

PROPOSITION XLV.

To find the content of a given cylinder.—The area of the baſe being found by prop. 33. if it be a circle, and by prop. 35. if it be an ellipſe (for in both caſes it is a cylinder), multiply it by the height of the cylinder, and the ſolid contents of the cylinder will be produced.

COROLLARY.

Fig. 23. And in this manner may be meaſured the ſolid content of veſſels and caſks not much different from a cylinder, as ABCD. If towards the middle EF it be ſomewhat groſſer, the area of the circle of the baſe being found (by 33d prop.) and added to the area of the middle circle EF, and the half of their ſum (that is, an arithmetical mean between the area of the baſe and the area of the middle circle) taken for the baſe of the veſſel, and multiplied into its height, the ſolid content of the given veſſel will be produced.

Note, That the length of the veſſel, as well as the diameters of the baſe, and of the circle EF, ought to be taken within the ſtaves; for it is the ſolid content within the ſtaves that is ſought.

PROPOSITION XLVI.

To find the ſolid content of a given cone.—Let the area of the baſe (found by prop. 33.) be multiplied into $\frac{1}{3}$ of the height, the product will give the ſolid content of the cone; for by the 10th 12. Eucl. a cone is the third part of a cylinder that has the ſame baſe and height.

PROPOSITION XLVII.

Fig. 24. 25. *To find the ſolid content of a* fruſtum *of a cone cut by a plane parallel to the plane of the baſe.*—Firſt, let the height of the entire cone be found, and thence (by the preceding prop.) its ſolid content; from which ſubtract the ſolid content of the cone cut off at the top, there will remain the ſolid content of the *fruſtum* of the cone.

How the content of the entire cone may be found, appears thus: Let ABCD be the *fruſtum* of the cone (either right or ſcalenous, as in the figures 24. and 25.) let the cone ECD be ſuppoſed to be completed; let AG be drawn parallel to DE, and let AH and EF be perpendicular on CD; it will be (by 2d 6. Eucl.) as CG : CA : : CD : CE : but (by art. 72. of Part I.) as CA : AH : : CE : EF; conſequently (by 22d 5. Eucl.)

as CG : AH :: CD : EF ; that is, as the exceſs of the diameter of the leſſer baſe is to the height of the *fruſtum*, ſo is the diameter of the greater baſe to the height of the entire cone.

COROLLARY.

Fig. 26. Some caſks whoſe ſtaves are remarkably bended about the middle, and ſtrait towards the ends, may be taken for two portions of cones, without any conſiderable error. Thus ABEF is a *fruſtum* of a right cone, to whoſe baſe EF, on the other ſide, there is another ſimilar *fruſtum* of a cone joined, EDCF. The vertices of theſe cones, if they be ſuppoſed to be completed, will be found at G and H. Whence (by the preceding propoſition) the ſolid content of ſuch veſſels may be found.

PROPOSITION XLVIII.

Fig. 27. A cylinder circumſcribed about a ſphere, that is, having its baſe equal to a great circle of the ſphere, and its height equal to the diameter of the ſphere, is to the ſphere as 3 to 2.

Let ABEC be the quadrant of a circle, and ABDC the circumſcribed ſquare; and likewiſe the triangle ADC; by the revolution of the figure about the right line AC, as axis, an hemiſphere will be generated by the quadrant, a cylinder of the ſame baſe and height by the ſquare, and a cone by the triangle. Let theſe three be cut any how by the plane HF, parallel to the baſe AB; the ſection in the cylinder will be a circle whoſe radius is FH, in the hemiſphere a circle of the radius EF, and in the cone a circle of the radius GF.

By art. 69. of Part I. EAq, or $HFq=EFq$ and FAq taken together (but $AFq=FGq$, becauſe $AC=CD$); therefore the circle of the radius FH is equal to a circle of the radius EF, together with a circle of the radius GF; and ſince this is true every where, all the circles together deſcribed by the reſpective *radii* HF (that is, the cylinder) are equal to all the circles deſcribed by the reſpective *radii* EF and FG (that is, to the hemiſphere and the cone taken together); but (by the 10th 12. Eucl.) the cone generated by the triangle DAC is one-third part of the cylinder generated by the ſquare BC. Whence it follows, that the hemiſphere generated by the rotation of the quadrant ABEC is equal to the remaining two-third parts of the cylinder, and that the whole ſphere is $\frac{2}{3}$ of the double cylinder, circumſcribed about it.

This is that celebrated 39th prop. 1. book of Archimedes of the ſphere and cylinder; in which he determines the proportion of the cylinder to the ſphere inſcribed to be that of 3 to 2.

COROLLARY.

Hence it follows, that the ſphere is equal to a cone whoſe height is equal to the ſemidiameter of the ſphere, having for its baſe a circle equal to the ſuperficies of the ſphere, or to four great circles of the ſphere, or to a circle whoſe radius is equal to the diameter of the ſphere (by prop. 41. of this.) And indeed a ſphere differs very little from the ſum of an infinite number of cones that have their baſes in the ſurface of the ſphere, and their common vertex in the centre of the ſphere; ſo that the ſuperficies of the ſphere (of whoſe dimenſion ſee prop. 41. of this) multiplied into the third part of the ſemidiameter, gives the ſolid content of the ſphere.

PROPOSITION XLIX.

Fig. 28. *To find the ſolid content of a ſector of the ſphere.*—A ſpherical ſector ABC (as appears by the corollary of the preceding prop.) is very little different from an infinite number of cones, having their baſes in the ſuperficies of the ſphere BEC, and their common vertex in the centre. Wherefore the ſpherical ſuperficies BEC being found (by prop. 42. of this), and multiplied into the third part of AB the radius of the ſphere, the product will give the ſolid content of the ſector ABC.

COROLLARY.

It is evident how to find the ſolidity of a ſpherical ſegment leſs than a hemiſphere, by ſubtracting the cone ABC from the ſector already found. But if the ſpherical ſegment be greater than a hemiſphere, the cone correſponding muſt be added to the ſector, to make the ſegment.

PROPOSITION L.

Fig. 29. *To find the ſolidity of the ſpheroid, and of its ſegments cut by planes perpendicular to the axis.*—

In prop. 44. of this, it is ſhown, that every where EH : EG :: CF : CD; but circles are as the ſquares deſcribed upon their rays, that is, the circle of the radius EH is to the circle of the radius EG, as CFq to CDq. And ſince it is ſo every where, all the circles deſcribed with the reſpective rays EH (that is, the ſpheroid made by the rotation of the ſemi ellipſis AFB around the axis AB) will be to all the circles deſcribed by the reſpective *radii* EG (that is, the ſphere deſcribed by the rotation of the ſemicircle ADB on the axis AB) as FCq to CDq; that is, as the ſpheroid to the ſphere on the ſame axis, ſo is the ſquare of the other axis of the generating ellipſe to the ſquare of the axis of the ſphere.

And this holds, whether the ſpheroid be formed by a revolution around the greater or leſſer axis.

COROLLARY 1.

Hence it appears, that the half of the ſpheroid, formed by the rotation of the ſpace AHFC around the axis AC, is double of the cone generated by the triangle AFC about the ſame axis; which is the 32d prop. of Archimedes of conoids and ſpheroids.

COROLLARY 2.

Hence, likewiſe, is evident the meaſure of ſegments of the ſpheroid cut by planes perpendicular to the axis. For the ſegment of the ſpheroid made by the rotation of the ſpace ANHE, round the axis AE, is to the ſegment of the ſphere having the ſame axis AC, and made by the rotation of the ſegment of the circle AMGE, as CFq to CDq.

But if the meaſure of this ſolid be wanted with leſs labour, by the 34th prop. of Archimedes of conoids and ſpheroids, it will be as BE to $AC+EB$; ſo is the cone generated by the rotation of the triangle AHE round the axis AE, to the ſegment of the ſphere made by the rotation of the ſpace ANHE round the ſame axis AE; which could eaſily be demonſtrated by the method of indiviſibles.

COROLLARY 3.

Hence it is eaſy to find the ſolid content of the ſegment of a ſphere or ſpheroid intercepted between two parallel planes, perpendicular to the axis. This agrees as well to the oblate as to the oblong ſpheroid: as is obvious.

COROLLARY 4.

Fig. 30. If a caſk is to be valued as the middle piece of an oblong ſpheroid, cut by the two planes DC and FG, at right angles to the axis: firſt, let the ſolid content of the half ſpheroid ABCED be meaſured by the preceding prop. from which let the ſolidity of the ſegment DEC be ſubtracted, and there will remain the ſegment ABCD; and this doubled will give the capacity of the caſk required.

The following method is generally made uſe of for finding the ſolid content of ſuch veſſels. The double area of the greateſt circle, that is, of that which is deſcribed by the diameter AB at the middle of the caſk, is added to the area of the circle at the end, that is, of the circle DC or FG (for they are uſually equal), and the third part of this ſum is taken for a mean baſe of the caſk; which therefore multiplied into the length of the caſk OP, gives the content of the veſſel required.

Sometimes veſſels have other figures, different from thoſe we have mentioned; the eaſy method of meaſuring which may be learned from thoſe who practiſe this art. What hath already been delivered is ſufficient for our purpoſe.

PROPOSITION LI.

Fig. 31. and 32. *To find how much is contained in a veſſel that is in part empty, whoſe axis is parallel to the horizon.*—Let AGBH be the great circle in the middle of the caſk, whoſe ſegment GBH is filled with liquor, the ſegment GAH being empty; the ſegment GBH is known, if the depth EB be known, and EH a mean proportional between the ſegments of the diameter AE and EB; which are found by a rod or ruler put into the veſſel at the orifice. Let the baſis of the caſk at a medium be found, which ſuppoſe to be the circle CKDL; and let the ſegment KCL be ſimilar to the ſegment GAH (which is either found by the rule of three, becauſe as the circle AGBH is to the circle CKDL; ſo is the ſegment GAH to the ſegment KCL; or is found from the tables of ſegments made by authors); and the product of this ſegment multiplied by the length of the caſk will give the liquid content remaining in the caſk.

PROPOSITION LII.

To find the ſolid content of a regular and ordinate body, —A tetraedon being a pyramid, the ſolid content is found by the 44th prop. The hexaedron, or cube, being a kind of priſm, it is meaſured by the 43d prop. An octaedron conſiſts of two pyramids of the ſame ſquare baſe, and of equal heights; conſequently its meaſure is found by the 44th prop. A dodecaedron conſiſts of 12 pyramids having equal equilateral and equiangular pentagonal baſes; and ſo one of theſe being meaſured (by the 44th prop. of this), and multiplied by 12, the product will be equal to the ſolid content of the dodecaedron. The icoſaedron conſiſts of 20 equal pyramids having triangular baſes; the ſolid content of one of which being found (by the 44th prop.), and multiplied by 20, gives the whole ſolid. The baſes and heights of theſe pyramids, if you want to proceed more exactly, may be found by trigonometry. See Trigonometry.

PROPOSITION LIII.

To find the ſolid content of a body however irregular. —Let the given body be immerſed into a veſſel of water, having the figure of a parallelopipedon or priſm, and let it be noted how much the water is raiſed upon the immerſion of the body. For it is plain, that the ſpace which the water fills, after the immerſion of the body, exceeds the ſpace filled before its immerſion, by a ſpace equal to the ſolid content of the body, however irregular. But when this exceſs is of the figure of a parallelopipedon or priſm, it is eaſily meaſured by the 43d prop. of this, *viz.* by multiplying the area of the baſe, or mouth of the veſſel, into the difference of the elevations of the water before and after immerſion: Whence is found the ſolid content of the body given.

In the ſame way the ſolid content of a part of a body may be found by immerſing that part only in water.

There is no neceſſity to inſiſt here on diminiſhing or enlarging ſolid bodies in a given proportion. It will be eaſy to deduce theſe things from the 11th and 12th books of Euclid.

“ The following rules are ſubjoined for the ready computation of the contents of veſſels, and of any ſolids in the meaſures in uſe in Great Britain.

“ I. To find the content of a cylindric veſſel in Engliſh wine gallons, the diameter of the baſe and altitude of the veſſel being given in inches and decimals of an inch.

“ Square the number of inches in the diameter of the veſſel; multiply this ſquare by the number of inches in the height: then multiply the product by the decimal fraction .0034; and this laſt product ſhall give the content in wine gallons and decimals of ſuch a gallon. To expreſs the rule arithmetically; let D repreſent the number of inches and decimals of an inch in the diameter of the veſſel, and H the decimals of an inch in the height of the veſſel; then the content in wine gallons ſhall be DDH×$\frac{34}{10000}$, or DDH× .0034. *Ex.* Let the diameter D=51.2 inches, the height H=62.3 inches, then the content ſhall be 51.2×51.2×62.3×.0034=555.27,342 wine-gallons.— This rule follows from prop. 33. and 45. For by the former, the area of the baſe of the veſſel is in ſquare inches DD×.7854; and by the latter, the content of the veſſel in ſolid inches is DDH×7854; which divided by 231 (the number of cubical inches in a wine-gallon) gives DDH×.0034, the content in wine-gallons. But though the charges in the exciſe are made (by ſtatute) on the ſuppoſition that the wine-gallon contains 231 cubical inches, yet it is ſaid, that in ſale 224 cubical inches, the content of the ſtandard meaſured at Guildhall (as was mentioned above), are allowed to be a wine-gallon.

“ II. Suppoſing the Engliſh ale-gallon to contain 282 cubical inches, the content of a cylindric veſſel is computed in ſuch gallons, by multiplying the ſquare of the diameter of a veſſel by its height as formerly, and their product by the decimal fraction .0,027,851: that is, the ſolid content in ale gallons is DDH× .0,027,851.

“ III. Suppoſing the Scots pint to contain about 103.4 cubical inches (which is the meaſure given by the ſtandards at Edinburgh, according to experiments mentioned above), the content of a cylindric veſſel is computed in Scots pints, by multiplying the ſquare of the diameter of the veſſel by its height, and the product of theſe by the decimal fraction .0076. Or the content of ſuch a veſſel in Scots pints is DDH× .0076.

“IV. Suppoſing the Wincheſter buſhel to contain 2187 cubical inches, the content of a cylindric veſſel is computed in thoſe buſhels by multiplying the ſquare of the diameter of the veſſel by the height, and the product by the decimal fraction .0,003,606. But the ſtandard buſhel having been meaſured by Mr Everard and others in 1696, it was found to contain only 2145.6 ſolid inches; and therefore it was enacted in the act for laying a duty upon malt, *That every round buſhel, with a plain and even bottom, being* $18\frac{1}{2}$ *inches diameter throughout, and* 8 *inches deep, ſhould be eſteemed a legal* Wincheſter *buſhel.* According to this act (ratified in the firſt year of queen Anne) the legal Wincheſter buſhel contains only 2150.42 ſolid inches. And the content of a cylindric veſſel is computed in ſuch buſhels, by multiplying the ſquare of the diameter by the height, and their product by the decimal fraction .003,625. Or the content of the veſſel in thoſe buſhels is DDH×.0,003,625.

“V. Suppoſing the Scots wheat-firlot to contain $21\frac{1}{4}$ Scots pints (as is appointed by the ſtatute 1618), and the pint to be conform to the Edinburgh ſtandards abovementioned, the contents of a cylindric veſſel in ſuch firlots is computed by multiplying the ſquare of the diameter by the height, and their product by the decimal fraction .00,358. This firlot, in 1426, is appointed to contain 17 pints; in 1457, it was appointed to contain 18 pints; in 1587, it is $19\frac{1}{4}$ pints; in 1628, it is $21\frac{1}{4}$ pints: and though this laſt ſtatute appears to have been founded on wrong computations in ſeveral reſpects, yet this part of that act that relates to the number of pints in the firlot ſeems to be the leaſt exceptionable; and therefore we ſuppoſe the firlot to contain $21\frac{1}{4}$ pints of the Edinburgh ſtandard, or about 2197 cubical inches; which a little exceeds the Wincheſter buſhel, from which it may have been originally copied.

“VI. Suppoſing the bear-firlot to contain 31 Scots pints (according to the ſtatute 1518), and the pint conform to the Edinburgh ſtandards, the content of a cylindric veſſel in ſuch firlots is found by multiplying the ſquare of the diameter by the height, and this product by .000245.

“When the ſection of the veſſel is not a circle, but an ellipſis, the product of the greateſt diameter by the leaſt is to be ſubſtituted in thoſe rules for the ſquare of the diameter.

“VII. To compute the content of a veſſel that may be conſidered as a fruſtum of a cone in any of thoſe meaſures.

“Let A repreſent the number of inches in the diameter of the greater baſe, B the number of inches in the diameter of the leſſer baſe. Compute the ſquare of A, the product of A multiplied by B, and the ſquare of B, and collect theſe into a ſum. Then find the third part of this ſum, and ſubſtitute it in the preceding rules in the place of the ſquare of the diameter; and proceed in all other reſpects as before. Thus, for example, the content in wine-gallons is $\overline{AA+AB+BB}+\frac{1}{3}\times H\times .0034$.

“Or, to the ſquare of half the ſum of the diameters A and B, add one-third part of the ſquare of half their difference, and ſubſtitute this ſum in the preceding rules for the ſquare of the diameter of the veſſel: for the ſquare of $\frac{1}{2}A+\frac{1}{2}B$ added to $\frac{1}{3}$ of the ſquare of $\frac{1}{2}A-\frac{1}{4}B$, gives $\frac{1}{3}AA+\frac{1}{3}AB+\frac{1}{3}BB$.

“VIII. When a veſſel is a fruſtum of a parabolic conoid, meaſure the diameter of the ſection at the middle of the height of the fruſtum; and the content will be preciſely the ſame as of a cylinder of the diameter of the ſame height with the veſſel.

“IX. When a veſſel is a fruſtum of a ſphere, if you meaſure the diameter of the ſection at the middle of the height of the fruſtum, then compute the content of a cylinder of the diameter of the ſame height with the veſſel, and from this ſubtract $\frac{1}{3}$ of the content of a cylinder of the ſame height of a baſe whoſe diameter is equal to its height; the remainder will give the content of the veſſel. That is, if D repreſent the diameter of the middle ſection, and H the height of the fruſtum, you are to the ſubſtitute $DD-\frac{1}{3}HH$ for the ſquare of the diameter of the cylindric veſſel in the firſt ſix rules.

“X. When the veſſel is a fruſtum of a ſpheriod if the baſes are equal, the content is readily found by the rule in p. 683. In other caſes, let the axis of the ſolid be to the conjugate axis as n to 1; let D be the diameter of the middle ſection of the fruſtum, H the height or length of the fruſtum; and ſubſtitute in the firſt ſix rules $DD-\frac{HH}{3nn}$ for the ſquare of the diameter of the veſſel.

“XI. When the veſſel is an hyperbolic conoid, let the axis of the ſolid be to the conjugate axis as n to 1, D the diameter of the ſection at the middle of the fruſtum, H the height or length: compute $DD\times\frac{1}{3nn}\times HH$, and ſubſtitute this ſum for the ſquare of the diameter of the cylindric veſſel in the firſt ſix rules.

“XII. In general, it is uſual to meaſure any round veſſel, by diſtinguiſhing it into ſeveral fruſtums, and taking the diameter of the ſection at the middle of each fruſtum; thence to compute the content of each as if it was a cylinder of that mean diameter; and to give their ſum as the content of the veſſel. From the total content, computed in this manner, they ſubtract ſucceſſively the numbers which expreſs the circular areas that correſpond to thoſe mean diameters, each as often as there are inches in the altitude of the fruſtum to which it belongs, beginning with the uppermoſt; in this manner calculate a table for the veſſel, by which it readily appears how much liquor is at any time contained in it, by taking either the dry or wet inches: having regard to the inclination or drip of the veſſel when it has any.

“This method of computing the content of a fruſtum from the diameter of the ſection at the middle of its height, is as exact in that caſe only when it it a portion of a parabolc conoid; but in ſuch veſſels as are in common uſe, the error is not conſiderable. When the veſſel is a portion of a cone or hyperbolic conoid, the content by this method is found leſs than the truth; but when it is a portion of a ſphere or ſpheriod, the content computed in this manner exceeds the truth. The difference or error is always the ſame in the different parts of the ſame or of ſimilar veſſels, when the altitude of the fruſtum is given. And when the altitudes are different, the error is in the triplicate ratio of

Gauging.

of the altitude. If exactneſs be required, the error in meaſuring the fruſtum of a conical veſſel in this manner is $\frac{1}{4}$ of the content of a cone ſimilar to the veſſel, of an altitude equal to the height of the fruſtum. In a ſphere, it is $\frac{1}{3}$ of a cylinder of a diameter and height equal to the fruſtum. In the ſpheroid and hyperbolic conoid, it is the ſame as in a cone generated by the right-angled triangle, contained by the two ſemiaxes of the figure, revolving about that ſide which is the ſemiaxis of the fruſtum.

" In the uſual method of computing a table for a veſſel, by ſubducting from the whole content the number that expreſſes the uppermoſt area as often as there are inches in the uppermoſt fruſtum and afterwards the numbers for the other are as ſucceſſively; it is obvious, that the contents aſſigned by the table, when a few of the uppermoſt inches are dry, are ſtated a little too high if the veſſel ſtands upon its leſſer baſe; but too low when it ſtands on its greater baſe; becauſe, when one inch is dry, for example, it is not the area at the middle of the uppermoſt fruſtum, but rather the area at the middle of the uppermoſt inch, that ought to be ſubducted from the total content, in order to find the content in this caſe.

" XIII. To meaſure round timber: Let the mean circumference be found in feet and decimals of a foot; ſquare it; multiply this ſquare by the decimal .079,577, and the product by the length. *Ex.* Let the mean circumference of a tree be 10.3 feet, and the length 24 feet. Then 10.3×10.3×.079,577×24=202.615, is the number of cubical feet in the tree. The foundation of this rule is, that when the circumference of a circle is 1, the area is .0,795,774,715, and that the areas of circles are as the ſquares of their circumferences.

" But the common way uſed by artificers for meaſuring round timber, differs much from this rule. They call one fourth part of the circumference the *girt*, which is by them reckoned the ſide of a ſquare, whoſe area is equal to the area of the ſection of the tree; therefore they ſquare the *girt*, and then multiply by the length of the tree. According to their method the tree of the laſt example would be computed at 159.13 cubical feet only.

" How ſquare timber is meaſured, will be eaſily underſtood from the preceding propoſitions. Fifty ſolid feet of hewn timber, and forty of rough timber make a load.

" XIV. To find the burden of a ſhip, or the number of tons it will carry, the following rule is commonly given. Multiply the length of the keel taken within board, by the breadth of the ſhip within board, taken from the midſhip beam from plank to plank, and the product by the depth of the hold, taken from the plank below the keelſon to the under part of the upper deck plank, and divide the product by 94, the quotient is the content of the tonnage required. This rule, however, cannot be accurate; nor can one rule be ſuppoſed to ſerve for the meaſuring exactly the burden of ſhips of all ſorts. Of this the reader will find more in the Memoirs of the Royal Academy of Sciences at Paris for the year 1721.

" Our author having ſaid nothing of weights, it may be of uſe to add briefly, that the Engliſh Troy-pound contains 12 ounces, the ounce 20 penny-weight, and the penny-weight 24 grains; that the Averdupois pound contains 16 ounces, the ounce 16 drams, and that 112 pounds is uſually called the hundred weight. It is commonly ſuppoſed, that 14 pounds Averdupois are equal to 17 pounds Troy. According to Mr Everard's experiments, 1 pound Averdupois is equal to 14 ounces 12 penny-weight and 16 grains Troy, that is, to 7000 grains; and an Averdupois ounce is 437$\frac{1}{2}$ grains. The Scots Troy-pound (which, by the ſtatute 1718, was to be the ſame with the French) is commonly ſuppoſed equal to 15$\frac{3}{4}$ ounces Engliſh Troy, or 7560 grains. By a mean of ſtandards kept by the dean of guild at Edinburgh, it is 7599 $\frac{8}{31}$ or 7600 grains. They who have meaſured the weights which were ſent from London after the union of the kingdoms to be the ſtandards by which the weights in Scotland ſhould be made, have found the Engliſh Averdupois pound (from a medium of the ſeveral weights) to weigh 7000 grains, the ſame as Mr Everard; according to which, the Scots, Paris, or Amſterdam pound, will be to the pound Averdupois as 38 to 35. The Scots Troy-ſtone contains 16 pounds, the pound 2 marks or 16 ounces, an ounce 16 drops, a drop 36 grains. Twenty Scots ounces make a Tron pound; but becauſe it is uſual to allow one to the ſcore, the Tron-pound is commonly 21 ounces. Sir John Skene, however, makes the Tron-ſtone to contain only 19$\frac{1}{4}$ pounds."

George.

GEORGE I. II. and III. kings of Great Britain. —George I. the ſon of Erneſt Auguſtus, duke of Brunſwick Lunenburgh, and elector of Hanover: ſucceeded to the thone of Great Britain in 1714, in virtue of an act of parliament, paſſed in the latter part of the reign of king William III. limiting the ſucceſſion of the crown, after the demiſe of this monarch, and queen Anne (without iſſue), to the princeſs Sophia of Hanover, and the heirs of her body, being Proteſtants.—George II. the only ſon of the former, ſucceeded him in 1727, and enjoyed a long reign of glory, dying amidſt the moſt rapid and extenſive conqueſts in the 77th year of his age. He was ſucceeded by his grandſon George III. For particulars, ſee BRITAIN, n° 374— 701.

GEORGE, or *Knights of St GEORGE*, has been the denomination of ſeveral military orders, whereof that of the garter is one of the moſt illuſtrious. See GARTER, and *St GEORGE*, below.

King GEORGE's Iſlands, are two iſlands in the South Sea, lying in W. Long. 144. 56. S. Lat. 28. They were firſt diſcovered by commodore Byron in 1765, and have ſince been viſited by Captain Cook in 1774. Commodore Byron's people had an encounter with the inhabitants, which proved fatal to ſome of the natives; but Captain Cook was more fortunate. A lieutenant and two boats well armed were ſent on ſhore by Captain Cook; and landed without oppoſition. As ſoon as the gentlemen landed, the iſlanders embraced them by touching noſes, a mode of civility uſed in New Zealand, which is 900 leagues diſtant, and the only place beſides this where the cuſtom has been obſerved to prevail. Notwithſtanding this ceremony, however, very little real friendſhip ſeemed to take place on the part of the iſlanders. They crowded about the boats as the people were ſtepping into them, and ſeemed in doubt whether they ſhould detain them or let them go; at laſt, however, not thinking themſelves ſufficiently ſtrong, they ſeemed contented with their departure, and aſſiſted them in puſhing off their boats; but ſome of the moſt turbulent threw ſtones into the water which fell very near them, and all ſeemed to glory that they had as it were driven them off. The Britiſh, however, brought off five dogs of a white colour with fine long hair, with which the iſland ſeemed to be plentifully ſupplied. Theſe they purchaſed with ſmall nails, and ſome ripe bananas which had been brought from the Marqueſas. On this iſland Mr Foreſter found a kind of ſcurvy graſs, which the natives informed him they were wont to bruiſe and mix with ſhell-fiſh; after which, they threw it into the ſea whenever they perceived a ſhoal of fiſh. This preparation intoxicates them for ſome time; and thus they are caught on the ſurface of the water without any other trouble than that of taking them out. The name of this plant among the natives is *e now*. The largeſt iſland, which they call *Tiookea*, is ſomething of an oval ſhape, and about 10 leagues in circuit; the other iſland, which lies two leagues to the weſtward of Tiookea, is four leagues from the northeaſt to ſouthweſt, and from five to three miles broad. The ſoil of both is extremely ſcanty; the foundation conſiſts of coral, very little elevated above the ſurface of the water.

GEORGE (St) or *GEORGE of Cappadocia*; a name whereby ſeveral orders, both military and religious, are denominated. It took its riſe from a ſaint or hero famous throughout all the Eaſt, called by the Greeks Μεγαλομαρτυρ, q. d. *great martyr*.

On ſome medals of the emperors John and Manuel Comneni, we have the figure of St George armed, holding a ſword or javelin in one hand, and in the other a buckler with this inſcription; an O, and therein a little
P
A, and ΓΕ—ΓΙΟC, making Ο ΑΓΙΟΣ ΓΕΟΡΓΟΣ, *O Holy*
O
George. He is generally repreſented on horſeback, as being ſuppoſed to have frequently engaged in combats in that manner. He is highly venerated throughout Armenia, Muſcovy, and all the countries which adhere to the Greek rite; from the Greek, his worſhip has long ago been received into the Latin church; and England and Portugal have both choſen him for their patron ſaint.

Great difficulties have been raiſed about this ſaint or Hero. His very exiſtence has been called in queſtion. Dr Heylin who wrote firſt and moſt about him, concluded with giving him entirely up, and ſuppoſing him only a ſymbolical device; and Dr Pettingal has turned him into a mere Baſilidian ſymbol of victory. Mr Pegg, in a paper in the Archæologia *, has attempted to reſtore him. And, finally, Mr Gibbon † has ſunk him into an Arian biſhop in the reigns of Conſtantius and Julian.—The biſhop alluded to, *GEORGE the Cappadocian*, was ſo ſurnamed, according to our author, from his parents or education; and was born at Epiphania in Cilicia, in a fuller's ſhop. "From this obſcure and ſervile origin he raiſed himſelf by the talents of a paraſite: and the patrons whom he aſſiduouſly flattered, procured for their worthleſs dependent a lucrative commiſſion, or contract, to ſupply the army with bacon. His employment was mean: he rendered it infamous. He accumulated wealth by the baſeſt arts of fraud and corruption; but his malverſations were ſo notorious, that George was compelled to eſcape from the purſuits of juſtice. After this diſgrace, in which he appears to have ſaved his fortune at the expence of his honour, he embraced with real or affected zeal, the profeſſion of Arianiſm. From the love, or the oſtentation, of learning, he collected a valuable library of hiſtory, rhetoric, philoſophy, and theology; and the choice of the prevailing faction promoted George of Cappadocia to the throne of Athanaſius." His conduct in this ſtation is repreſented by our hiſtorian as polluted by cruelty and avarice, and his death conſidered as a juſt puniſhment for the enormities of his life, among which Mr Gibbon ſeems to rank his "enmity to the Gods."

The immediate occaſion of his death, however, as narrated by eccleſiaſtical writers, will probably not appear calculated to add any ſtain to his memory. "There was in the city of Alexandria a place in which the heathen prieſts had been uſed to offer human ſacrifices. This place, as being of no uſe, Conſtantius gave to the church of Alexandria, and George the biſhop gave orders for it to be cleared, in order to build a Chriſtian church on the ſpot. In doing this they diſcovered an immenſe ſubterraneous cavern, in which the heathen myſteries had been performed, and in it were many human ſkulls. Theſe, and other things which they found in the place, the Chriſtians brought out and expoſed to public ridicule. The heathens provoked at this exhibition, ſuddenly took arms, and ruſhing upon the Chriſtians, killed many of them with ſwords, clubs, and ſtones: ſome alſo they ſtrangled, and ſeveral they crucified. On this the Chriſtians proceeded no farther in clearing the temple; but the heathens, purſuing their advantage, ſeized the biſhop as he was in the church, and put him in priſon. The next day they diſpatched him; and then faſtening the body to a camel, he was dragged about the ſtreets all day, and in the evening they burnt him and the camel together. This fate, Sozomen ſays, the biſhop owed in part to his haughtineſs while he was in favour with Conſtantius, and ſome ſay the friends of Athanaſius were concerned in this maſſacre; but he aſcribes it chiefly to the inveteracy of the heathens, whoſe ſuperſtitious he had been very active in aboliſhing.

"This George, the Arian biſhop of Alexandria was a man of letters, and had a very valuable library, which Julian ordered to be ſeized for his own uſe; and in his orders concerning it, he ſays that many of the books were on philoſophical and rhetorical ſubjects, though many of them related to the doctrine of the impious Galileans (as in his ſneering contemptuous way he always affected to call the Chriſtians).

'Theſe books (ſays he) I could wiſh to have utterly deſtroyed; but leſt books of value ſhould be deſtroyed along with them, let theſe alſo be carefully ſought for.'

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* Vol. I. 1.

† Hiſt, Vol. II. p. 104.

But Mr Gibbon gives a different turn to the affair of George's murder, as well as relates it with different circumſtances. "The Pagans, (ſays he) excited his devout avarice; and the rich temples of Alexandria were either pillaged or inſulted by the haughty prelate, who exclaimed in a loud and threatening tone, 'How long will theſe ſepulchres be permitted to ſtand?' Under the reign of Conſtantius, he was expelled by the fury, or rather by the juſtice of the people; and it was not without a violent ſtruggle, that the civil and military powers of the ſtate could reſtore his authority and gratify his revenge. The meſſenger who proclaimed at Alexandria the acceſſion of Julian, announced the downfall of the archbiſhop. George, with two of his obſequious miniſters, count Diodorus and Dracontius maſter of the mint, was ignominiouſly dragged in chains to the public priſon. At the end of 24 days, the priſon was forced open by the rage of a ſuperſtitious multitude, impatient of the tedious forms of judicial proceedings. The *enemies of gods* and men expired under their cruel inſults; the lifeleſs bodies of the archbiſhop and his aſſociates were carried in triumph through the ſtreets on the back of a camel; and the inactivity of the Athanaſian party was eſteemed a ſhining example of evangelical patience. The remains of theſe guilty wretches were thrown into the ſea; and the popular leaders of the tumult declared their reſolution to diſappoint the devotion of the Chriſtians, and to intercept the future honours of theſe martyrs, who had been puniſhed like their predeceſſors, by the enemies of their religion. The fears of the Pagans were juſt, and their precautions ineffectual. The meritorious death of the archbiſhop obliterated the memory of his life. The rival of Athanaſius was dear and ſacred to the Arians, and the ſeeming converſion of thoſe ſectaries introduced his worſhip into the boſom of the Catholic church. The odious ſtranger, diſguiſing every circumſtance of time and place, aſſumed the maſk of a martyr, a ſaint, and a Chriſtian hero; and the infamous George of Cappadocia has been transformed into the renowned St George of England, the patron of arms, of chivalry, and of the garter."

Knights of St George. See Garter. There have been various other orders under this denomination, moſt of which are now extinct; particularly one founded by the emperor Frederic III. in the year 1470, to guard the frontiers of Bohemia and Hungary againſt the Turks; another called *St George of Alfama*, founded by the kings of Arragon; another in Auſtria and Carinthia; and another in the republic of Genoa, ſtill ſubſiſting, &c.

Religious of St George. Of theſe there are divers orders and congregations; particularly canons regular of St George in Alga, at Venice, eſtabliſhed by authority of pope Boniface IX. in the year 1404. The foundation of this order was laid by Bartholomew Colonna, who preached in 1396, at Padua, and ſome other villages in the ſtate of Venice. Pope Pius V. in 1570, gave theſe canons precedence of all other religions. Another congregation of the ſame inſtitute in Sicily, &c.

St George del Mina, the capital of the Dutch ſettlements on the gold-coaſts of Guinea, ſituated ſeven or eight miles weſt of Cape-coaſt caſtle, the capital of the Britiſh ſettlements there. W. Long. 5'. and N. Lat. 5°.

St George, a fort and town of Aſia, in the peninſula on this ſide the Ganges, and on the coaſt of Coromandel, belonging to the Britiſh; it is otherwiſe called *Madraſs*, and by the natives *Chili patam*. It fronts the ſea, and has a ſalt-water river on its back ſide, which hinders the freſh-water ſprings from coming near the town, ſo that they have no good water within a mile of them. In the rainy ſeaſons it is incommoded by inundations; and from April to September, it is ſo ſcorching hot, that if the ſea-breezes did not cool the there would be no living there. There are two towns, one of which is called the *White Town*, which is walled round, and has ſeveral bulwarks and baſtions to defend it: it is 400 paces long and 150 broad, and is divided into regular ſtreets. Here are two churches, one for the Proteſtants, and the other for the Papiſts; as alſo a good hoſpital, a town hall, and a priſon for debtors. They are a corporation, and have a mayor and aldermen with other proper officers. The *Black Town* is inhabited by Gentoos, Mahometans, and Portugueſe, and Armenian Chriſtians, and each religion have their temples and churches. This, as well as the White Town is ruled by the Engliſh governor and his council. The diamond-mines are but a week's journey from this place, which renders them pretty plentiful, but there are no large ones ſince that great diamond was procured by governor Pitt. This colony produces very little of its own growth or manufacture for foreign markets, and the trade is in the hands of the Armenians and Gentoos. The chief things the Britiſh deal in, beſides diamonds, are calicoes, chintz, muſlins, and the like. This colony may conſiſt of 80,000 inhabitats in the towns and villages, and there are generally 400 or 500 Europeans. Their rice is brought by ſea to Gangam and Orixa, their wheat from Surat and Bengal, and their fire-wood from the iſlands of Diu, ſo that an enemy, with a ſuperior force at ſea, may eaſily diſtreſs them. The houſes of the White Town are built with brick, and have lofty rooms and flat roofs; but the Black Town conſiſts chiefly of thatched cottages. The military power is lodged in the governor and council, who are alſo the laſt reſort in civil cauſes. The company have two chaplains, who officiate by turns, and have each 100l. a-year, beſides the advantages of trade. They never attempt to make proſelytes, but leave that to the Popiſh miſſionaries. The ſalaries of the company's writers are very ſmall: but if they have any fortune of their own, they may make it up by trade; which muſt generally be the caſe, for they commonly grow rich. It was taken by the French in 1746, who reſtored it at the peace of Aix-la-Chapelle.

St George's, the largeſt of the Bermuda or Summer iſlands. W. Long. 65. 10. N. Lat. 32. 30.

Croſs of St George, a red one in a field argent, which makes part of the Britiſh ſtandard.

GEORGIA, a country of Aſia, bounded on the north by Circaſſia, on the eaſt by Dagheſtan and Shirvan, on the ſouth by Armenia, and on the weſt by the Euxine or Black Sea; comprehending the greateſt part of the ancient Colchis, Iberia, and Albania. About the etymon of the name of this country, authors are not agreed. The moſt probable opinion is, that it is a corruption by ſoftening of *Kurgia,* from the river Kur; whence alſo it is ſuppoſed that the inhabitants are called by the Perſians indifferently *Gurgi* and *Kurgi*; and the country *Kurgiſtan* and *Gurgiſtan*: It is divided by a ridge of mountains into eaſtern and weſtern; the former of which is again ſubdivided into the kingdoms of Caket, Carduel or Carthuel, and Goguetia; and the latter into the provinces of Abkhaſia, Mireta, or Imeretia, and Guriel. Another diviſion is into Georgia Proper, Abkhaſia, and Mingrelia. A third diviſion will be afterwards mentioned.

"Georgia (ſays Sir John Chardin) is as fertile a country as can be ſeen; the bread is as good here as in any part of the world; the fruit of an exquiſite flavour, and of different ſorts; no place in Europe yields better pears and apples, and no place in Aſia better pomegranates. The country abounds with cattle, veniſon, and wild-fowl, of all ſorts; the river Kur is well ſtocked with fiſh; and the wine is ſo rich, that the king of Perſia has always ſome of it for his own table. The inhabitants are robuſt, valiant, and of a jovial temper; great lovers of wine, and eſteemed very truſty and faithful; endowed with good natural parts, but, for want of education, very vicious. The women are generally ſo fair and comely, that the wives and concubines of the king of Perſia and his court are for the moſt part Georgian women. Nature has adorned them with graces no where elſe to be met with: it is impoſſible to ſee them without loving them; they are of a good ſize, clean-limbed, and well-ſhaped." Another traveller, however, of no mean character, thus expreſſes himſelf with reſpect to the women: "As to the Georgian women, they did not at all ſurpriſe us; for we expected to find them perfect beauties. They are, indeed, no way diſagreeable; and may be counted beauties, if compared with the Curdes. They have an air of health that is pleaſing enough; but, after all, they are neither ſo handſome nor ſo well ſhaped as is reported. Thoſe who live in the towns have nothing extraordinary more than the others; ſo that I may, I think, venture to contradict the accounts that have been given of them by moſt travellers."

This country formerly abounded with great cities, as appears not only from its hiſtory, but from the ruins of many of them ſtill viſible, which ſhow that they muſt have been very large, opulent, and magnificently built. Theſe were all deſtroyed by the inundations of northern barbarians from mount Caucaſus, as the Alans, Huns, Suevi, and ſome others, ſo much noted in hiſtory for their ſtrength, courage, and conqueſts.

The lateſt diviſion of this country is into nine provinces; five of which are ſubject to the famous prince Heraclius, forming what is commonly called the kingdom of Georgia; and four are under the dominion of David, compoſing the kingdom or principality of Imeretia. See IMERETIA.

This whole country is ſo extremely beautiful, that ſome fanciful travellers have imagined they had here found the ſituation of the original garden of Eden. The hills are covered with foreſts of oak, aſh, beech, cheſnuts, walnuts, and elms, encircled with vines, growing perfectly wild, but producing vaſt quantities of grapes. From theſe is annually made as much wine as is neceſſary for the yearly conſumption; the remainder are left to rot on the vines. Cotton grows ſpontaneouſly, as well as the fineſt European fruit-trees. Rice, wheat, millet, hemp, and flax, are raiſed on the plains, almoſt without culture. The valleys afford the fineſt paſturage in the world; the rivers are full of fiſh; the mountains abound in minerals, and the climate is delicious; ſo that nature appears to have laviſhed on this favoured country every production that can contribute to the happineſs of its inhabitants.

On the other hand, the rivers of Georgia, being fed by mountain torrents, are at all ſeaſons either too rapid or too ſhallow for the purpoſes of navigation: the Black Sea, by which commerce and civilization might be introduced from Europe, has been till very lately in the excluſive poſſeſſion of the Turks: the trade of Georgia by land is greatly obſtructed by the high mountains of Caucaſus: and this obſtacle is ſtill increaſed by the ſwarms of predatory nations, by which thoſe mountains are inhabited.

It is ſaid, that in the 15th century, a king of Georgia divided among his five ſons the provinces of Carduel and Caket, Imeretia, Mingrelia, Guriel, and Abkhaſia. Theſe petty princes were too jealous to unite for their common defence, and too weak ſingly to reſiſt a foreign enemy, or even to check the incroachments of their great vaſſals, who ſoon became independent. By forming a party among theſe nobles, the Turks gradually gained poſſeſſion of all the weſtern provinces, while the Perſians occupied the governments of Carduel and Caket. Since that period the many unſucceſsful attempts of the Georgians to recover their liberty, have repeatedly produced the devaſtation of their country. Abbas the Great is ſaid to have carried off in one expedition from the provinces of Carduel aud Caket no leſs than 80,000 families, a number which, probably, exceeds the whole actual population of thoſe provinces. The moſt horrible cruelties were again exerciſed on the unhappy people, at the beginning of the preſent century, by the mercileſs Nadir; but theſe were trifling evils, compared with thoſe ariſing from the internal diſſenſions of the great barons. This numerous body of men, idle, arrogant, and ferocious, poſſeſſed of an unlimited power over the lives and properties of their vaſſals, having no employment but that of arms, and no hopes of aggrandizing themſelves but by the plunder of their rivals, were conſtantly in a ſtate of warfare; and as their ſucceſs was various, and the peaſants of the vanquiſhed were conſtantly carried off and ſold to the Turks or Perſians, every expedition increaſed the depopulation of the country. At length they invited the neighbouring mountaineers, by the hopes of plunder, to take part in their quarrels; and theſe dangerous allies, becoming acquainted with the country, and being ſpectators of the weakneſs of its inhabitants, ſoon completed its deſolation. A few ſqualid wretches, half naked, half ſtarved, and driven to deſpair by the mercileſs exactions of their landlords, are thinly diſperſed over the moſt beautiful provinces of Georgia. The revolutions of Perſia, and the weakneſs of the Turks, have indeed enabled the princes of the country to recover their independence; but the ſmallneſs of their revenue has hitherto diſabled them from repreſſing effectually the tyranny of the nobles, and relieving the burdens of the peaſants.

The capital of Georgia is Teflis, where prince Heraclius reſides (See Teflis.) Of this prince, ſo celebrated for his exploits and ſucceſs in ſhaking off the Ottoman yoke, we have the following account by the late profeſſor Guldenſtaedt when he travelled into theſe parts in 1770. “ Heraclius, or, as he is called, the tzar Iracli, is above 60 years old, of a middle ſize, with a long countenance, a dark complexion, large eyes, and a ſmall beard. He paſſed his youth at the court and in the army of the celebrated Nadir Shah, where he contracted a fondneſs for Perſian cuſtoms and manners, which he has introduced into his kingdom. He has ſeven ſons and ſix daughters. He is much revered and dreaded by the Perſian khans his neighbours; and is uſually choſen to mediate between them in their diſputes with each other. When they are at war, he ſupports one of the parties with a few troops, who diffuſe a ſpirit and courage among the reſt, becauſe the Georgian ſoldiers are eſteemed the braveſt of thoſe parts; and prince Heraclius himſelf is renowned for his courage and military ſkill. When on horſeback he has always a pair of loaded piſtols at his girdle, and, if the enemy is near, a muſket ſlung over his ſhoulder. In all engagements he is the foremoſt to give examples of perſonal bravery; and frequently charges the enemy at the head of his troops with the ſabre in his hand. He loves pomp and expence; he has adopted the dreſs of Perſia; and regulates his court after the manner of that country. From the example of the Ruſſian troops, who were quartered in Georgia during the laſt Turkiſh war, he has learnt the uſe of plates, knives, and forks, diſhes and houſehold furniture, &c.”

The ſubjects of Heraclius are eſtimated at about 60,000 families; but this, notwithſtanding the preſent deſolated ſtate of the country, is probably an under valuation. The peaſants belonging to the queen, and thoſe of the patriarch, pay no tax to the prince, and therefore do not appear on the books of the revenue officers. Many ſimilar exceptions have likewiſe been granted by the prince to his ſons-in-law, and his favourites. Beſides, as the impoſt on the peaſants is not a poll-tax, but a tax on hearths, the inhabitants of a village, on the approach of the collectors, frequently carry the furniture of ſeveral huts into one, and deſtroy the remainder, which are afterwards very eaſily replaced. It is probable, therefore, that the population of Georgia does not fall ſhort of 350,000 ſouls. The revenues may be eſtimated at about 150,000 roubles, or 26,250l. They conſiſt of, 1. The cuſtoms, farmed at 1750l.—2. Rent paid by the farmers of the mint at Teflis, 1750l.—3. The tribute paid by the Khans of Erivan and Ganſha, 7000l.—and, 4. The hearth money levied on the peaſants, amounting to 15,750l. The common coins here are the abaſſes, of about 15d. value, and a ſmall copper coin, ſtamped at the mint at Teflis. Beſides theſe, a large quantity of gold and ſilver money is brought into the country from Perſia and Turkey, in exchange for honey, butter, cattle, and blue linens.

The government of Georgia is deſpotic; but, were it not for the aſſiſtance of the Ruſſian troops, the prince would be frequently unable to carry his decrees into execution. The puniſhments in criminal caſes are ſhockingly cruel; fortunately they are not frequent, becauſe it is ſeldom difficult to eſcape into ſome of the neighbouring countries, and becauſe the prince is more enriched by confiſcating the propriety of the criminal, than by putting him to torture. Judicial combats are conſidered as the privilege of nobility, and take place when the cauſe is extremely intricate, or when the power and intereſt of two claimants are ſo equal, that neither can force a deciſion of the court in his favour. This mode of trial is called an appeal to the judgment of God.

The dreſs of the Georgians nearly reſembles that of the Coſaks; but men of rank frequently wear the habit of Perſia. They uſually dye their hair, beard, and nails with red. The Georgian women employ the ſame colour to ſtain the palms of their hands. On their heads they wear a cap or fillet, under which their black hair falls on their forehead: behind, it is braided into ſeveral treſſes. Their eye-brows are painted with black, in ſuch a manner as to form one entire line, and their faces are perfectly coated with white and red. Their robe is open to the girdle, ſo that they are reduced to conceal the breaſts with their hands. Their air and manner are extremely voluptuous. Being generally educated in convents, they can all read and write; a qualification which is very unuſual among the men, even of the higheſt rank. Girls are betrothed as ſoon as poſſible, often at three or four years of age. In the ſtreets the women of rank are always veiled, and then it is indecent in any man to accoſt them. It is likewiſe uncivil in converſation to inquire after the wives of any of the company. Theſe, however, are not ancient cuſtoms, but are a conſequence of the violences committed by the Perſians, under Shah Nadir.

Travellers accuſe the Georgians of drunkenneſs, ſuperſtition, cruelty, ſloth, avarice, and cowardice; vices which are every where common to ſlaves and tyrants, and are by no means peculiar to the natives of this country. The deſcendants of the coloniſts, carried off by Shah Abbas, and ſettled at Peria, near Iſpahan, and in Maſanderan, have changed their character with their government; and the Georgian troops, employed in Perſia againſt the Affghans, were advantageouſly diſtinguiſhed by their docility, their diſcipline, and their courage.

The other inhabitants of Georgia are Tartars, Oſſi, and Armenians, called in the Georgian language Somakhi. Theſe laſt are found all over Georgia, ſometimes mixed with the natives, and ſometimes in villages of their own. They ſpeak among themſelves their own language, but all underſtand and can talk the Georgian. Their religion is partly the Armenian, and partly the Roman Catholic. They are the moſt oppreſſed of the inhabitants, but are ſtill diſtinguiſhed by that inſtinctive induſtry which every where characterizes the nation.

Beſides theſe, there are in Georgia conſiderable numbers of Jews, called, in the language of the country, Uria. Some have villages of their own; and others are mixed with the Georgian, Armenian, and Tartar inhabitants, but never with the Oſſi. They pay a ſmall tribute above that of the natives.

Georgia, one of the United States of America, lying between South Carolina and Florida. It extends 120 miles upon the ſea-coſt, and 300 miles from thence to the Apalachian mountains, and its boundaries to the north and ſouth are the rivers Savannah and Alatamaha. The whole coaſt is bordered with iſlands; the principal of which are Skidaway, Waſſaw, Oſſabaw, St. Catherines, Sapelo, Frederica, Jekyl, Cumberland, and Amelia.

The ſettlement of a colony between the rivers Savannah and Alatamaha was meditated in England in 1732, for the accommodation of poor people in Great Britain and Ireland, and for the farther ſecurity of Carolina. Private compaſſion and public ſpirit conſpired to promote the benevolent deſign. Humane and opulent men ſuggeſted a plan of tranſporting a number of indigent families to this part of America free of expence. For this purpoſe they applied to the king, George II. and obtained from him letters patent bearing date June 9, 1732, for legally carrying into execution what they had generouſly projected. They called the new province *Georgia*, in honour of the king, who encouraged the plan. A corporation conſiſting of 21 perſons, was conſtituted by the name of, The Truſtees for ſettling and eſtabliſhing the colony of Georgia.

In November 1732, 116 ſettlers embarked for Georgia to be conveyed thither free of expence, furniſhed with every thing requiſite for building and for cultivating the ſoil. Mr James Oglethorpe, one of the truſtees, and an active promoter of the ſettlement, embarked as the head and director of theſe ſettlers. They arrived at Charleſtown early in the next year. Mr Oglethorpe, accompanied by William Bull, ſhortly after his arrival, viſited Georgia; and after ſurveying the country, marked the ſpot on which Savannah now ſtands, as the fitteſt to begin their ſettlement. Here they accordingly began and built a ſmall fort; a number of ſmall huts for their defence and accommodation. Such of the ſettlers as were able to bear arms were embodied, and well appointed with officers, arms, and ammunition. A treaty of friendſhip was concluded between the ſettlers and their neighbours the Creek Indians, and every thing wore the aſpect of peace and future proſperity. But the fundamental regulations eſtabliſhed by the truſtees of Georgia were ill adapted to the circumſtances and ſituation of the poor ſettlers, and of pernicious conſequence to the proſperity of the province. Yet although the truſtees were greatly miſtaken with reſpect to their plan of ſettlement, it muſt be acknowledged their views were generous. Like other diſtant legiſlators, who framed their regulations upon principles of ſpeculation, they were liable to many errors and miſtakes; and however good their deſign, their rules were found improper and impracticable. Theſe injudicious regulations and reſtrictions, the wars in which they were involved with the Spaniards and Indians, and the frequent inſurrections among themſelves, threw the colony into a ſtate of confuſion and wretchedneſs too great for human nature long to endure. Their oppreſſed ſituation was repreſented to the truſtees by repeated complaints; till at length finding that the province languiſhed under their care, and weary with the complaints of the people, they in the year 1752 ſurrendered their charter to the king, and it was made a royal government.—In the year 1740, the Rev. George Whitfield founded an orphan-houſe academy in Georgia, about 12 miles from Savannah. Mr Whitefield died at Newbury Port, in New England, in October 1770, in the 56th year of his age, and was buried under the Preſbyterian church in that place. From the time Georgia became a royal government in 1752, till the peace of Paris in 1763, ſhe ſtruggled under many difficulties ariſing from the want of credit, from friends, and the frequent moleſtations of enemies. The good effects of the peace were ſenſibly felt in the province of Georgia. From this time it began to flouriſh under the fatherly care of governor Wright. To form a judgement of the rapid growth of the colony, we need only attend to its exports. In the year 1763, they conſiſted of 7500 barrels of rice, 9633 pound of indigo, 1250 buſhels of Indian corn, which, together with deer and beaver ſkins, naval ſtores, proviſions, timber, &c. amounted to no more than L.27,021 ſterling. Ten years afterwards, in 1773, they amounted to L.121,677 ſterling. The chief articles of export from this ſtate are rice, tobacco, indigo, ſago, lumber of various kinds, naval ſtores, leather, deer-ſkins, ſnake-root, myrtle, bees-wax, corn, live ſtock, &c.

During the late war, Georgia was over-run by the Britiſh troops, and the inhabitants were obliged to flee into the neighbouring ſtates for ſafety. Since the peace, the progreſs of the population of this ſtate is ſaid to have been aſtoniſhingly rapid: though it has been a good deal checked within theſe few years by the hoſtile irruptions of the Creek Indians, who frequently haraſs the frontiers of the ſtate. Treaties have been held, and ceſſations of hoſtilities agreed to, and the late late treaty with the United States will probably ſecure a laſting peace.

Theſe Indians inhabit the middle parts of the ſtate, and are the moſt numerous tribe of Indians of any within the limits of the United States. Their whole number is 17,280, of which 5860 are fighting men. Their principal towns lie in latitude 32° and longitude 11° 20′ from Philadelphia. They are ſettled in a hilly but not mountainous country. The ſoil is fruitful in a high degree, and well watered, abounding in creeks and rivulets, whence they are called the *Creek Indians*. The Seminolas, a diviſion of the Creek nation, inhabit a level flat country on the Apalachicola and Flint rivers, fertile and well watered. The Chactaws or flat-heads inhabit a very fine and extenſive tract of hilly country, with large and fertile plains intervening, between the Alabama and Miſſiſſipi rivers, in the weſtern part of this ſtate. This nation have 43 towns and villages, in three diviſions, containing 12,123 ſouls, of which 4041 are fighting men. The Chicaſaws are ſettled on the head branches of the Tombecbe, Mobile, and Yazoo rivers, in the north-weſt corner of the ſtate. Their country is an extenſive plain, tolerably well watered from ſprings, and of a pretty good ſoil. They have 7 towns, the central one of which is in latitude 34° 23′, and longitude 14° 30′ weſt. The number of ſouls in this nation have been reckoned at 1725, of which 575 are fighting men.

That part of Georgia which has been laid out in counties is divided into the following, *viz.* Chatham, Effingham, Burke, Richmond, Wilkes, Liberty, Glynn, Camden, Waſhington, Greene, Franklin; and the chief towns are, Savannah, Ebenezer, Wayneſborough and

Louiſville, Auguſta, Waſhington, Sunbury, Brunſwick, St Patrick's, Golphinton, Greenſburg.—Savannah was formerly the capital, and is ſtill the largeſt town (ſee SAVANNAH). But the preſent ſeat of government in this ſtate is *Auguſta*, ſituated on the ſouthweſt bank of Savannah river, about 134 miles from the ſea, and 117 northweſt of Savannah. The town, which contains about 200 houſes, is on a fine large plain; and as it enjoys the beſt ſoil, and the advantage of a central ſituation between the upper and lower counties, is riſing faſt into importance. Louiſville, however, is deſigned as the future ſeat of government in this ſtate. It has lately been laid out on the bank of Ogeechee river, about 70 miles from its mouth, but is not yet built.

Savannah river forms a part of the diviſional line which ſeparates this ſtate from South Carolina. It is formed principally of two branches, by the names of *Tugulo* and *Keowee*, which ſpring from the mountains. Ogeeche river, about 18 miles ſouth of the Savannah, is a ſmaller river, and nearly parallel with it in its courſe. Alatamaha, about 60 miles ſouth of Savannah river, is formed by the junction of the Okonee and Okemulgee branches. It is a noble river, but of difficult entrance. Like the Nile, it diſcharges itſelf by ſeveral mouths into the ſea. Beſides theſe, there is Turtle river, Little Sitilla, Great Sitilla, Crooked river, and St Mary's, which form a part of the ſouthern boundary of the United States. The rivers in the middle and weſtern parts of this ſtate are Apalachicola, which is formed by the Chatahouchee and Flint rivers, Mobile, Paſeagoula, and Pearl rivers. All theſe running ſouthwardly, empty into the Gulf of Mexico.

In the grand convention at Philadelphia in 1787, the inhabitants of this ſtate were reckoned at 90,000, including three-fifths of 20,000 negroes. But from the cenſus returned June 25th 1791, the numbers ſtand thus: white inhabitants 53284, ſlaves 29264. Total 82548. No general character will apply to the inhabitants at large. Collected from different parts of the world, as intereſt, neceſſity, or inclination led them, their character and manners muſt of courſe partake of all the varieties which diſtinguiſh the ſeveral ſtates and kingdoms from whence they came. There is ſo little uniformity, that it is difficult to trace any governing principles among them. An averſion to labour is too predominant, owing in part to the relaxing heat of the climate, and partly to the want of neceſſity to excite induſtry. An open and friendly hoſpitality, particularly to ſtrangers, is an ornamental characteriſtic of a great part of this people.

In regard to religion, politics, and literature, this ſtate is yet in its infancy. In Savannah is an epiſcopal church, a preſbyterian church, a ſynagogue, and a German Lutheran church, ſupplied occaſionally by a German miniſter from Ebenezer, where there is a large convenient ſtone church, and a ſettlement of ſober induſtrious Germans of the Lutheran religion. In Auguſta they have an epiſcopal church. In Midway is a ſociety of Chriſtians eſtabliſhed on the congregational plan. Their anceſtors emigrated in a colony from Dorcheſter, near Boſton, about the year 1700, and ſettled at a place named Dorcheſter, about 20 miles ſouthweſt of Charleſtown, South Carolina. In 1752, for the ſake of a better climate and more land, almoſt the whole ſociety removed and ſettled at Midway. They, as a people, retain in a great meaſure that ſimplicity of manners, that unaffected piety and brotherly love which characterized their anceſtors, the firſt ſettlers of New England. The upper counties are ſupplied pretty generally by baptiſt and methodiſt miniſters; but the greater part of the ſtate is without miniſters of any denomination.

The numerous defects in the late conſtitution of this ſtate, induced the citizens pretty univerſally to petition for a reviſion of it. It was accordingly reviſed, or rather a new one was formed, in the courſe of the year 1789, nearly upon the plan of the conſtitution of the United States, which has lately been adopted by the ſtate.

The charter containing the preſent ſyſtem of education in this ſtate was paſſed in the year 1785. A college, with ample and liberal endowments, is inſtituted in Louiſville, a high and healthy part of the country, near the centre of the ſtate. There is alſo proviſion made for the inſtitution of an academy in each county in the ſtate, to be ſupported from the ſame funds, and conſidered as parts and members of the ſame inſtitution, under the general ſuperintendance and direction of a preſident and board of truſtees, appointed for their literary accompliſhments from the different parts of the ſtate, and inveſted with the cuſtomary powers of corporations. The inſtitution thus compoſed is denominated *the Univerſity of Georgia*. The funds for the ſupport of the inſtitution are principally in lands, amounting in the whole to about 50,000 acres, a great part of which is of the beſt quality, and at preſent very valuable. There are alſo nearly L.6000 ſterling in bonds, houſes, and town lots in the town of Auguſta. Other public property to the amount of L.1000 in each county has been ſet apart for the purpoſes of building and furniſhing their reſpective academies. The funds orinally deſigned for the ſupport of the orphan-houſe, are chiefly in rice plantations and negroes. For a farther account of this ſtate, ſee APPENDIX.

GEORGIC, a poetical compoſition upon the ſubject of huſbandry, containing rules therein, put into a pleaſing dreſs, and ſet off with all the beauties and embelliſhments of poetry. The word is borrowed from the Latin *georgicus*, and that of the Greek γεωργικος, of γη, *terra*, "earth," and εργαζομαι, *opero*, "I work, or labour," of εργον, *opus*, "work." Heſiod and Virgil are the two greateſt maſters in this kind of Poetry. The moderns have produced nothing in this kind, except Rapin's book of Gardening; and the celebrated poem intitled Cyder, by Mr Philips, who, if he had enjoyed the advantage of Virgil's language, would have been ſecond to Virgil in a much nearer degree.

GEORGIUM SIDUS. See ASTRONOMY, n° 328, &c.

GEPIDÆ, GEPIDES, or GEPIDI (anc. geog.), according to Procopius, were a Gothic people, or a canton or branch of them; ſome of whom, in the migration of the Goths, ſettled in an iſland at the mouth of the Viſtula, which they called *Gepidos* after their own name, which denotes lazy or ſlothful; others in Dacia, calling their ſettlement there *Gepidia*.

GERANITES, in natural hiſtory, an apppellation given to ſuch of the ſemipellucid gems as are marked with a ſpot reſembling a crane's eye.

GERANIUM, CRANE'S BILL, in botany: A genus of the decandria order, belonging to the monodelphia claſs of plants; and in the natural method ranking under the 14th order, *Gruinales*. Its characters are theſe: the flower hath a permanent empalement, compoſed of five ſmall oval leaves, and five oval or heart-ſhaped petals, ſpreading open, which are in ſome ſpecies equal, and in others the upper two are much larger than the three lower. It has ten ſtamina, alternately longer than each other, but ſhorter than the petals, and terminated by oblong ſummits. In the bottom of the flower is ſituated a five-cornered germen, which is permanent. The flower is ſucceeded by five ſeeds, each being wrapped up in the huſk of the beak, where they are twiſted together at the point, ſo as to form the reſemblance of a ſtork's beak. There are above 80 ſpecies.

The common wild ſorts of this plant, and thoſe alſo which are brought to the curious from the colder climates, are hardy enough, and require little care; but the African ſpecies, and the others from hot countries, which make ſo very beautiful a figure in our green-houſes, require great care in their culture and propagation.

Theſe may be propagated by ſeed, which ſhould be ſown toward the end of March in beds of light earth, and carefully ſhading them from the ſun, and giving them frequent, but gentle waterings, till they are well rooted. The mats with which theſe beds are covered are to be taken off in gentle ſhowers, and always in the hot weather at nights, that the plants may have the benefit of the dew. They ſhould remain about two months in this bed, by which time they will have taken root. Some pots of about ſeven inches wide are then to be filled with light earth, and the plants are to be carefully taken up with as much as poſſible of their own earth about them, and planted ſeverally in the middle of theſe pots; when they are to be ſet in a ſhady place and watered at times till they have taken root. When they are well rooted, they ſhould be ſet in a more expoſed place to harden them, and ſhould ſtand out till the middle of October; but when the mornings begin to grow froſty, they muſt be removed into the green-houſe, and then placed as near the windows as poſſible, and the windows ſhould be open upon them till the weather is very cold. During the winter they muſt be frequently watered a little at a time, and their dead leaves ſhould be pulled off. They muſt not ſtand under the ſhade of other plants, nor need any artificial heat.

Thoſe who are deſirous that their plants ſhould be large and flower ſoon, ſow the ſeeds on a moderate hot-bed in the ſpring; when they are come up, they ſhould not be drawn weak, and the pots into which they are tranſplanted ſhould be plunged into another moderate hot-bed, ſhading them from the ſun till they have taken root, and gradually inuring them to the open air, into which they ſhould be removed in the beginning of June, and placed in a ſheltered ſituation with other exotic plants.

The ſhrubby African geraniums are commonly propagated by cuttings, which, planted in a ſhady border, in June or July, will take good root in five or ſix weeks; and they may then be taken up and planted in ſeparate pots, placing them in the ſhade till they have taken new root; after which they may be removed into a ſheltered ſituation, and treated as the ſeedling plants.

Geranium ſtands recommended as one of the greateſt vulneraries and abſtergents of the vegetable world, and is highly extolled for its power of ſtopping profluvia of the menſes, and hæmorrhages of all kinds. Experience confirms the truth of this, eſpecially among the poor people in the country; and it were to be wiſhed that the plant could be brought into more eſteem in the ſhops, where at preſent it is diſregarded.

GERAR, or GERARA, (anc. geog.), the ſouth boundary of Canaan near Berſeba; ſituated between Cades and Sur; two deſarts well known, the former facing Egypt, the latter Arabia Petræa.

GERARD (John), a learned Lutheran divine, was profeſſor of divinity, and rector of the Academy of Jena, the place of his birth. He wrote, 1. The harmony of the eaſtern languages; 2. A Treatiſe on the Coptic Church; and other works which are eſteemed. He died in 1668.

GERARDE (John), a ſurgeon in London, and the greateſt botaniſt of his time, was many years chief gardener to Lord Burleigh; who was himſelf a great lover of plants, and had the beſt collection of any nobleman in England, among which were a great number of exotics introduced by Gerarde. In 1597 be publiſhed his *Herbal*, which was printed at the expence of J. Norton, who procured the figures from Francfort. In 1663, Thomas Johnſon, an apothecary, publiſhed an improved edition of Gerarde's book; which met with ſuch approbation by the Univerſity of Oxford, that they conferred on him the degree of doctor of phyſic; and it is ſtill much eſteemed. The deſcriptions in the herbal are plain and familiar; and both theſe authors have laboured more to make their readers underſtand the characters of the plants, than to inform them that they themſelves underſtood Greek an Latin.

GERARDIA, in botany: A genus of the angioſpermia order, belonging to the didynamia claſs of plants; and in the natural method ranking under the 40th order, *Perſonatæ*. The calyx is quinquefid, the corolla bilabiate; the under lip tripartite; the ſide lobes emarginated, and the middle one bipartite; the capſule bilocular and gaping.

GERBIER (Sir Balthazar), a painter of Antwerp, born in the year 1592, diſtinguiſhed himſelf by painting ſmall figures in diſtemper. King Charles I. was ſo pleaſed with his performances, that he invited him to his court, where he obtained the eſteem of the duke of Buckingham, and grew into great favour. He was not only knighted, but ſent to Bruſſels, where he long reſided as agent for the king of Great Britain.

GERFALCON. See FALCO.

GERGESA, (anc. geog.) a Transjordan town, no otherwiſe known than by the *Gergeſeni* of St Matthew, and *Gergeſæi* of Moſes; ſuppoſed to have ſtood in the neighbourhood of Gadara and near the ſea of Tiberias. The *Gergeſæi*, one of the ſeven ancient people of Canaan, leſs frequently mentioned than the reſt, appear to have been leſs conſiderable and more obſcure: their name is from *Girgaſi*, one of Canaan's ſons. See GIRGASHITES.

GERIZIM. See GARIZIM.

GERM, among gardeners. See GERMEN.

GERMAN, in matters of genealogy, ſignifies whole, entire, or own. *Germani, quaſi eadem ſtirpe geniti;* (Feſt.) Hence,

*Brother-*GERMAN, denotes a brother both by the father's and mother's ſide, in contradiſtinction to uterine brothers, &c. who are only ſo by the mother's ſide.

*Couſins-*GERMAN, are thoſe in the firſt or neareſt degree, being the children of brothers or ſiſters.

Among the Romans we have no inſtance of marriage between couſins-german before the time of the emperor Claudius, when they were very frequent.

Theodoſius prohibited them under very ſevere penalties, even fine and proſcription. See CONSANGUNITY.

GERMAN, or *Germanic*, alſo denotes any thing belonging to Germany; as the German empire, German flute, &c.

GERMANDER, in botany. See the article TEUCRIUM.

GERMANICUS CÆSAR, the ſon of Druſus, and paternal nephew to the emperor Tiberius, who adopted him; a renowned general, but ſtill more illuſtrious for his virtues. He took the title of *Germanicus* from his conqueſts in that country; and though he had the moderation to refuſe the empire offered to him by his army, Tiberius, jealous of his ſucceſs, and of the univerſal eſteem he acquired, cauſed him to be poiſoned, A. D. 29, aged 34. He was a protector of learning; and compoſed ſome Greek comedies and Latin poems, ſome of which are ſtill extant.

GERMANY, a very extenſive empire of Europe, but which, in different ages of the world, has had very different limits. Its name, acccording to the moſt probable conjecture, is derived from the Celtic words *Ghar man*, ſignifying a warlike man, to which their other name, *Allman*, or *Aleman*, likewiſe alludes.

The ancient hiſtory of the Germans is altogether wrapped up in obſcurity; nor do we, for many ages, know any thing more of them than what may be learned from the hiſtory of their wars with the Romans. The firſt time we hear them mentioned by the Roman hiſtorians, is about the year 211 B. C. at which time Marcellus ſubdued Inſubria and Liguria, and defeated the Gæſatæ a German nation ſituated on the banks of the Rhine. From this time hiſtory is ſilent with regard to any of theſe nothern nations, till the eruption of the Cimbri and Teutones, who inhabited the moſt northerly part of Germany. The event of their enterpriſe, is related under the articles AMBRONES, CIMBRI, and TEUTONES. We muſt not, however, imagine, becauſe theſe people happened to invade Italy at the ſame time, that therefore their countries were contiguous to one another. The Cimbri and Teutones only, dwelt beyond the Rhine; while the Ambrones inhabited the country between Switzerland and Provence. It is indeed very difficult to fix the limits of the country called *Germany* by the Romans. The ſouthern Germans were intermixed with the Gauls, and the northern ones with the Scythians; and thus the ancient hiſtory of the Germans includes that of the Dacians, Huns, Goths, &c. till the deſtruction of the weſtern Roman empire by them. Ancient Germany, therefore, we may reckon to have included the northern part of France, the Netherlands, Holland, *Germany* ſo called at preſent, Denmark, Pruſſia, Poland, Hungary, part of Turkey in Europe, and Muſcovy.

1
Limits of ancient High Germany.

2
Nations inhabiting Lower Germany.

The Romans divided Germany into two regions; Belgic or Lower Germany, which lay to the ſouthward of the Rhine; and Germany Proper, or high Germany. The firſt lay between the rivers Seine and the Rhine; and in this we find a number of different nations, the moſt remarkable of which were the following.

1. The Ubii, whoſe territory lay between the Rhine and the Moſa or Maeſe, and whoſe capital was the city of Cologne. 2. Next to them were the Tungri, ſuppoſed to be the ſame whom Cæſar calls *Eburones* and *Condruſi*; and whoſe metropolis, then called *Attuatica*, has ſince been named *Tongres*. 3. Higher up from them, and on the other ſide of the Moſelle, were the Treviri, whoſe capital was Auguſta Trevirorum, now *Triers*. 4. Next to them were the Tribocci, Nemetes, and Vangiones. The former dwelt in Alſace, and had Argentoratum, now *Straſburg*, for their capital: the others inhabited the cities of Worms, Spire, and Mentz. 5. The Mediomatrici were ſituated along the Moſelle, about the city of Metz in Lorrain; and above them were ſituated another German nation, named *Raurici, Rauraci*, or *Rauriaci*, and who inhabited that part of Helvetia, or Switzerland, about Baſil. To the weſtward and Southward of theſe were the Nervii, Sueſſones, Silvanectes, Leuci, Rhemi, Lingones, &c. who inhabited Belgic Gaul.

Between the heads of the Rhine and Danube, was ſeated the ancient kingdom of Vindelicia, whoſe capital was called *Auguſta Vindelicorum*, now *Augſburg*. Below it on the banks of the Danube were the kingdoms of Noricum and Pannonia. The firſt of theſe was divided into Noricum *Ripenſe* and *Mediterraneum*. It contained a great part of the provinces of Auſtria, Styria, Carinthia, Tyrol, Bavaria, and ſome others of leſs note. The latter contained the kingdom of Hungary, divided into Upper and Lower; and extending from Illyricum to the Danube, and the mountains Cætii in the neighbourhood of *Vindebona*, now *Vienna*.

3
Nations inhabiting High Germany.

Upper or High Germany lay beyond the Rhine and the Danube. Between the Rhine and the Elbe were the following nations. 1. The Chauci, Upper and Lower; who were divided from each other by the river Viſurges, now the *Weſer*. Their country contained what is now called *Bremen, Lunenburg, Friezland* and *Groningben*. The upper Chauci had the Cheruſci, and the lower the Chamavi on the ſouth-eaſt, and the German Ocean on the north-weſt. 2. The Friſii, upper and lower, were divided from the lower Chauci by the river Amiſia, now the Ems; and from one another by an arm of the Rhine. Their country ſtill retains the name of *Frieſland*, and is divided into eaſt and weſt; but the latter is now diſmembered from Germany, and become one of the Seven United Provinces. 3. Beyond the Iſela, now the *Iſel*, which bounded the country of the Friſii, were ſituated the Bructeri, who inhabited that tract now called *Broecmorland*; and the

Marſi, about the river Luppe. On the other ſide of that river were the *Uſipii Uſipites*; but theſe were famed for oftenchanging their territories, and therefore found in other places. 4. Next to theſe were the Juones, or inhabitants of Juliers, between the Maeſe and the Rhine. 5. The Catti, another ancient and warlike nation, inhabited Heſſe and Thuringia, from the Hartzian mountains to the Rhine and Weſer; among whom were comprehended the Mattiaci, whoſe capital is by ſome thought to be *Marpurg*, by others *Baden*. 6. Next to theſe were the Seducii bordering upon Suabia; Nariſci, or the ancient inhabitants of Northgow, whoſe capital was Nuremberg; and the Marcomanni, whoſe country anciently reached from the Rhine to the head of the Danube, and to the Neckar. The Marcomanni afterwards went and ſettled in Bohemia and Moravia, under their general or king Maroboduus; and ſome of them in Gaul, whence they drove the Boii, who had ſeated themſelves there. 6. On the other ſide of the Danube, and between the Rhine and it, were the Hermunduri, who poſſeſſed the country now called *Miſnia* in Upper Saxony; though ſome make their territories to have extended much farther, and to have reached quite to, or even beyond, the kingdom of Bohemia, once the ſeat of the Boii, whence its name. 8. Beyond them, on the north of the Danube, was another ſeat of the Marcomanni along the river Albis, or Elbe, 9. Next to Bohemia were ſituated the Quadi, whoſe territories extended from the Danube, to Moravia, and the northern part of Auſtria. Theſe are comprehended under the ancient name of *Suevi*; part of whom at length forced their way into Spain, and ſettled a kingdom there. 10. Eaſtward of the Quadi were ſituated the Baſtarnæ, and parted from them by the Granna, now *Gran*, a river that falls into the Danube, and by the Carpathian mountains, from them called *Alpes Baſtarnicæ*. The country of the Baſtarnæ indeed made part of the European Sarmatia, and ſo without the limits of Germany properly ſo called; but we find theſe people ſo often in league with the German nations, and joining them for the deſtruction of the Romans, that we cannot but account them as one people.

Between thoſe nations already taken notice of, ſeated along the other ſides of the Danube and the Hercynian foreſt, were ſeveral others whoſe exact ſituation is uncertain, viz. the Martingi, Burii, Borades, Lygii, or Logiones, and ſome others, who are placed by our geographers along the foreſt abovementioned, between the Danube and the Viſtula.

On this ſide the Hercynian foreſt, were the famed Rhætii, now *Griſons*, ſeated among the Alps. Their country, which was alſo called *Weſtern Illyricum*, was divided into Rhætia *Prima* or *Propria*, and *Secunda*; and was then of much larger extent, ſpreading itſelf towards Suabia, Bavaria, and Auſtria.

On the other ſide of the Hercynian foreſt, were, 1. The Suevi, who ſpread themſelves from the Viſtula to the river Elbe. 2. The Longobardi, ſo called, according to ſome, on account of their wearing long beards; but, according to others, on account of their conſiſting of two nations, viz. the Bardi and Lingones. Theſe dwelt along the river Elbe, and bordered ſouthward on the Chauci abovementioned. 3. The Burgundi, of whoſe original ſeat we are uncertain. 4. The Semnones; who, about the time of Tiberius, were ſeated on the River Elbe. 5. The Angles, Saxons, and Goths; were probably the deſcendants of the Cimbri; and inhabited the countries of Denmark, along the Baltic ſea, and the peninſula of Scandinavia, containing Norway, Sweden, Lapland, and Finmark. 6. The Vandals were a Gothic nation, who proceeding from Scandinavia, ſettled in the countries now called *Mecklenburgh* and *Brandenburgh*. 7. Of the ſame race were the Dacians, who ſettled themſelves in the neighbourhood of Palus Mæotis, and extended their territories along the banks of the Danube.

4
Wars of the Scordiſci with the Romans.

Theſe were the names of the German nations who performed the moſt remarkable exploits in their wars with the Romans. Beſides theſe, however, we find mention made of the Scordiſci, a Thracian nation, who afterwards ſettled on the banks of the Danube. About the year 113 B. C. They ravaged Macedon, and cut off a whole Roman army ſent againſt them; the general, M. Porcis Cato, grandſon to Cato the cenſor, being the only perſon who had the good fortune to make his eſcape. After this they ravaged all Theſſaly; and advanced to the coaſts of the Adriatic, into which, becauſe it ſtopped their further progreſs, they diſcharged a ſhower of darts. By another Roman general, however, they were driven back into their own country with great ſlaughter; and, ſoon after, Metellus ſo weakened them by repeated defeats, that they were incapable, for ſome time, of making any more attempts on the Roman provinces. At laſt, in the conſulſhip of M. Livius Druſus and L. Calpurnius Piſo, the former prevailed on them to paſs the Danube, which thenceforth became the boundary between the Romans and them. Notwithſtanding this, in the time of the Jugurthine war, the Scordiſci repaſſed the Danube on the ice every winter, and being joined by the Triballi, a people of Lower Mæſia, and the Daci of Upper Mæſia, penetrated as far as Macedon, committing every where dreadful ravages. So early did theſe northern nations begin to be formidable to the Romans, even when they were moſt renowned for warlike exploits.

5
Expedition of Julius Cæſar into Germany.

Till the time of Julius Cæſar, however, we hear nothing more concering the Germans. About 58 years B. C. he undertook his expedition into Gaul; during which, his aſſiſtance was implored by the Ædui, againſt Arioviſtus, a German prince who oppreſſed them. Cæſar, pleaſed with this opportunity of increaſing his power, invited Arioviſtus to an interview; but this being declined, he next ſent deputies deſiring him to reſtore the hoſtages he had taken from the Æduii and to bring no more troops over the Rhine into Gaul. To this a haughty anſwer was returned; and a battle ſoon after enſued, in which Arioviſtus was entirely defeated, and with great difficulty made his eſcape.

In 55 B. C. Cæſar having ſubdued the Sueſſones, Bellovaci, Ambiani, Nervii, and other nations of Belgic Gaul, haſtened to oppoſe the Uſipetes and Tencteri. Theſe nations having been driven out of their own country by the Suevi, had croſſed the Rhine with a deſign to ſettle in Gaul. As ſoon as he appeared, the Germans ſent him a deputation, offering to join him provided he would aſſign them lands. Cæſar replied, that there was no room in Gaul for them; but he would deſire the Ubii to give them leave to ſettle among them. Upon this, they deſired time to treat with the Ubii; but in the mean time fell upon ſome Roman ſquadrons: which ſo provoked Cæſar, that he immediately marched againſt them, and, coming unexpectedly upon them, defeated them with great ſlaughter. They fled in the utmoſt confuſion; but the Romans purſued them to the conflux of the Rhine and the Maeſe, where the ſlaughter was renewed with ſuch fury, that almoſt 400,000 of the Germans periſhed. After this, Cæſar being reſolved to ſpread the terror of the Roman name through Germany, built a bridge over the Rhine, and entered that country. In this expedition, however, which was his laſt in Germany, he performed no remarkable exploit. A little before his death, indeed, he had projected the conqueſt of that as well as of a great many other countries; but his aſſaſſination prevented the execution of his deſigns. Nor is there any thing recorded of the Germans till about 17 B. C. when the Tencteri made an irruption into Gaul, and defeated M. Lollius, proconſul of that provincee. At laſt, however, they were repulſed, and forced to retire with great loſs beyond the Rhine.

6
Rhæti invade Italy.

7
They are ſubdued, together with the Vindelici and Norici.

8
And the Pannonians.

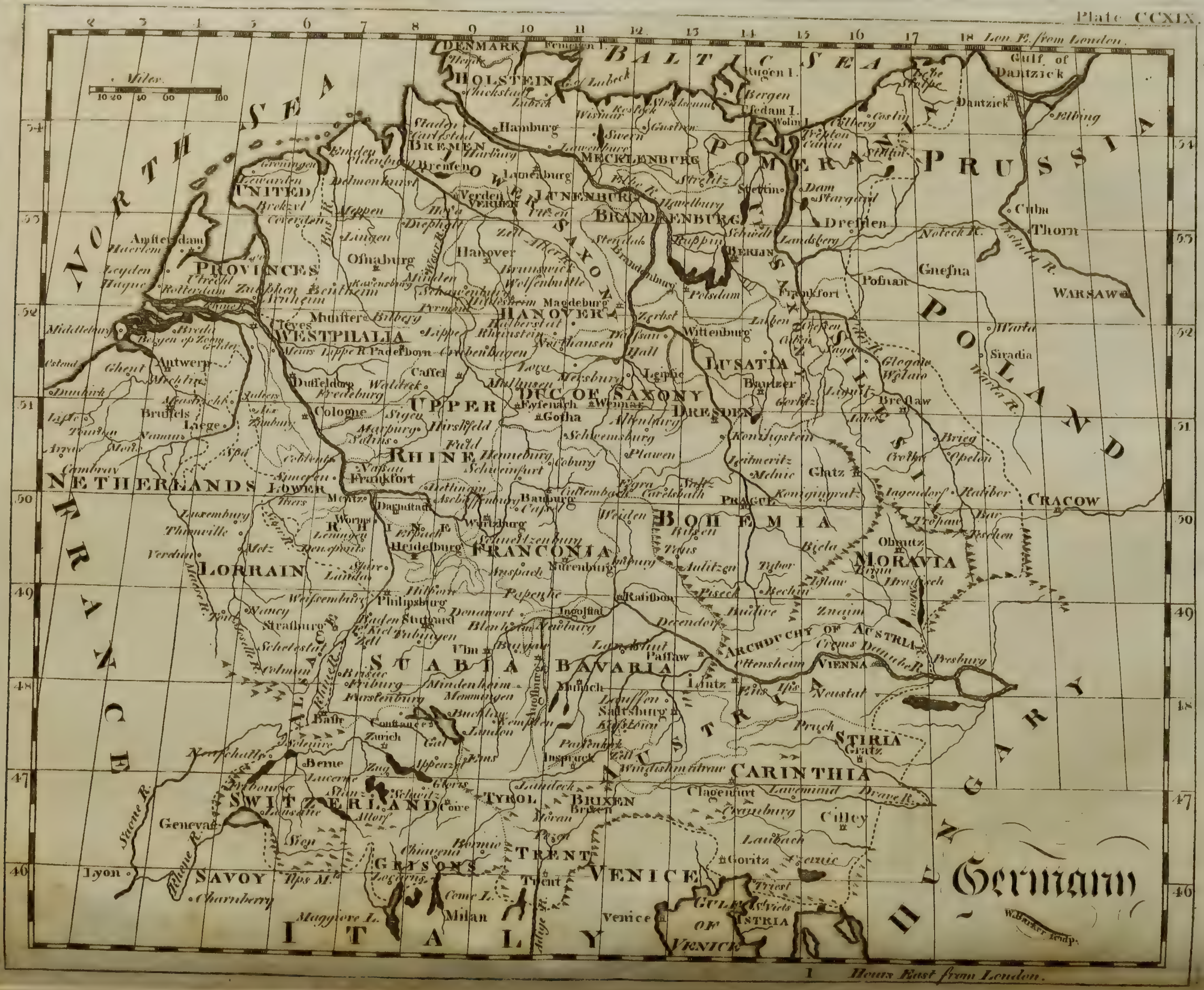
Soon after this the Rhæti invaded Italy, where they committed the greateſt devaſtations, putting all they met to the ſword, without diſtinction of ſex or age: nay, we are told, that when they happened to take women with child, they conſulted their augurs to know whether the child was a male or female; and if they pronounced it a male, the mother was immediately maſſacred. Againſt theſe barbarians was ſent Druſus, the ſecond ſon of Livia, a youth of extraordinary valour and great accompliſhments. He found means to bring them to a battle; in which the Romans proved victorious, and cut in pieces great numbers of their enemies, with very little loſs on their own ſide. Thoſe who eſcaped the general ſlaughter, being joined by the Vindelici took their rout towards Gaul, with a deſign to invade that province. But Auguſtus, upon the firſt notice of their march, diſpatched againſt them Tiberius with ſeveral choſen legions. He was no leſs ſucceſsful than Druſus had been; for, having tranſported his troops over the lake Brigantium, now Conſtance, he fell unexpectedly on the enemy, gave them a total overthrow, took moſt of their ſtrong holds, and obliged the whole nation to ſubmit to ſuch terms as he choſe to impoſe upon them. Thus were the Vindelici, the Rhæti, and Norici, three of the moſt barbarous nations in Germany, ſubdued. Tiberius, to keep the conquered countries in awe, planted two colonies in Vindelicia, and opened from thence a road into Rhætia and Noricum. One of the cities which he built for the defence of his colonies, he called, from his father Druſus, *Druſomagus*; the other by the name of Auguſtus, *Auguſta Vindelicorum*; which cities are now known by the names of *Mimminghen and Augſburgh*. He next encountered the Pannonians, who had been ſubdued by Agrippa, but revolted on hearing the news of that great commander's death, which happened 11 years B. C. Tiberius, however, with the aſſiſtance of their neighbours the Scordiſci, ſoon forced them to ſubmit. They delivered up their arms, gave hoſtages, and put the Romans in poſſeſſion of all their towns and ſtrong holds. Tiberius ſpared their lives; but laid waſte their fields, plundered their cities, and ſent the beſt part of their youth into other countries.

9
Exploits of Druſus in Germany.

In the mean time, Druſus having prevented the Gauls from revolting, which they were ready to do, prepared to oppoſe the Germans who dwelt beyond the Rhine. They had collected the moſt numerous and formidable army that had ever been ſeen in thoſe parts; with which they were advancing towards the Rhine, in order to invade Gaul. Druſus defeated them as they attempted to croſs that river; and purſuing the advantage he had gained, entered the country of the Uſipetes, now *Relinchuſen*, and from thence advanced againſt the Sicambri, in the neighbourhood of the Lyppe and Iſſel. Them he overthrew in a great battle, laid waſte their country, burnt moſt of their cities, and following the courſe of the Rhine, approached the German ocean, reducing the Friſii and the Chauci between the Ems and the Elbe. In theſe marches the troops ſuffered extremely for want of proviſions; and Druſus himſelf was often in great danger of being drowned, as the Romans who attended him were at that time quite unacquainted with the flux and reflux of the ocean.

The Roman forces went into eaſt Frieſland for their winter-quarters; and next year (10 B. C.) Druſus marched againſt the Tencteri, whom he eaſily ſubdued. Afterwards, paſſing the Lupias, now the Lyppe, he reduced the Catti and Cheruſci, extending his conqueſts to the banks of the Viſurgis or Weſer: which he would have paſſed, had he not been in want of provſions, the enemy having laid waſte the country to a conſiderable diſtance. As he was retiring, the Germans unexpectedly fell upon him in a narrow paſſage; and having ſurrounded the Roman army, cut a great many of them in pieces. But Druſus having animated his men by his example, after a bloody conflict, which laſted the whole day, the Germans were defeated with ſuch ſlaughter, that the ground was ſtrewed for ſeveral miles with dead bodies. Druſus found in their camp a great quantity of iron-chains which they had brought for the Romans; and ſo great was their confidence, that they had agreed before hand about the diviſion of the booty. The Tencteri were to have the horſe, the Cheruſci and Sicambri the baggage, and the Uſipetes and Catti the captives. After this victory, Druſus built two forts to keep the conquered countries in awe; the one at the confluence of the Lyppe and the Alme, and the other in the country of the Catti on the Rhine. On this occaſion he alſo made a famous canal, long after called in honour of him *Foſſa Druſiana*, to convey the waters of the Rhine into the Sala or Sale. It extended eight miles; and was very convenient for conveying the Roman troops by water to the countries of the Friſii and Chauci, which was the deſign of the undertaking.

The following year (9 B. C.) Auguſtus, bent on ſubduing the whole of Germany, advanced to the banks of the Rhine, attended by his two ſons in-law Tiberius and Druſus. The former he ſent againſt the Daci, who lived up to the ſouth of the Danube; and the latter to complete the conqueſts he had ſo ſucceſsfully begun in the weſtern parts of Germany. The former eaſily overcame the Daci, and tranſplanted 40,000 of them into Gaul. The latter having paſſed the


Germany
W. Barker sculp.
Miles
10 20 40 60 100
Lon. E. from London.
Hours East from London.
NORTH SEA
BALTIC SEA
DENMARK
HOLSTEIN
MECKLENBURG
POMERANIA
PRUSSIA
Gulf of Dantzick
Dantzick
UNITED PROVINCES
LOWER SAXONY
BRANDENBURG
Berlin
Hanover
Hamburg
WESTPHALIA
LUSATIA
SILESIA
POLAND
Warsaw
Cracow
NETHERLANDS
UPPER RHINE
LOWER RHINE
DUC. OF SAXONY
Dresden
BOHEMIA
Prague
MORAVIA
FRANCONIA
LORRAIN
SUABIA
BAVARIA
ARCHDUCHY OF AUSTRIA
Vienna
AUSTRIA
STIRIA
CARINTHIA
TYROL
TRENT
SWITZERLAND
GRISONS
SAVOY
VENICE
Gulf of Venice
ISTRIA
FRANCE
ITALY
HUNGARY

the Rhine, ſubdued all the nations from that river to the Elbe; but having attempted in vain to croſs this laſt, he ſet out for Rome: an end, however, was put to his conqueſts and his life by a violent fever, with which he was ſeized on his return.

After the death of Druſus, Tiberius again over-ran all thoſe countries in which Druſus had ſpent the preceding ſummer: and ſtruck ſome of the northern nations with ſuch terror, that they ſent deputies to ſue for peace. This, however, they could not obtain upon any terms; the emperor declaring that he would not conclude a peace with one, unleſs they all deſired it. But the Catti, or according to ſome the Sicambri, could not by any means be prevailed upon to ſubmit; ſo that the war was ſtill carried on, though in a languid manner, for about 18 years. During this period, ſome of the German nations had quitted their foreſts, and begun to live in a civilized manner under the protection of the Romans; but one Quintilius Varus being ſent to command the Roman forces in that country, ſo provoked the inhabitants by his extortions, that not only thoſe who ſtill held out refuſed to ſubmit, but even the nations that had ſubmitted were ſeized with an eager deſire of throwing off the yoke. Among them was a young nobleman of extraordinary parts and valour, called *Arminius*. He was the ſon of Sigimer, one of the moſt powerful lords among the Catti, had ſerved with great reputation in the Roman armies, and been honoured by Auguſtus with the privileges of a Roman citizen and the title of knight. But the love of his country prevailing over his gratitude, he reſolved to improve the general diſcontent which reigned among his countrymen, to deliver them from the bondage of a foreign dominion. With this view he engaged, underhand, the leading men of all the nations between the Rhine and the Elbe, in a conſpiracy againſt the Romans. In order to put Varus off his guard, he at the ſame time adviſed him to ſhow himſelf to the inhabitants of the more diſtant provinces, adminiſter juſtice among them, and accuſtom them, by his example, to live after the Roman manner, which he ſaid would more effectually ſubdue them than the Roman ſword. As Varus was a man of a peaceable temper, and averſe from military toils, he readily conſented to this inſidious propoſal; and, leaving the neighbourhood of the Rhine, marched into the country of the Cheruſci. Having there ſpent ſome time in hearing cauſes and deciding civil controverſies, Arminius perſuaded him to weaken his army, by ſending out detachments to clear the country of robbers. When this was done, ſome diſtant nations of Germany roſe up in arms by Arminius's directions; while thoſe through which Varus was to paſs in marching againſt them, pretended to be in a ſtate of profound tranquillity, and ready to join the Romans againſt their enemies.

10 Arminius heads the Germans againſt the Romans.

11 Cuts off Varrus with his army.

On the firſt news of the revolt, Varus marched againſt the enemy with three legions and ſix cohorts; but being attacked by the Germans as he paſſed thro' a wood, his army was almoſt totally cut off, while he himſelf and moſt of his officers fell by their own hands. Such a terrible overthrow, though it raiſed a general conſternation in Rome, did not, however, diſhearten Auguſtus, or cauſe him to abandon his enterpriſe. About two years after (A. D. 12.), Tiberius and Germanicus were appointed to command in Germany. The death of Auguſtus, however, which happened ſoon after, prevented Tiberius from going on his expedition; and Germanicus was for ſome time hindered from proceeding in his, by a revolt of the legions, firſt in Pannonia, and then in Germany. About the year 15, Germanicus having brought over the ſoldiers to their duty, laid a bridge acroſs the Rhine, over which he marched 12,000 legionaries, 26 cohorts of the allies, and eight alæ (ſquadrons of 300 each) of horſe. With this he firſt traverſed the Cœſian foreſt (part of the Hercynian, and thought to lie partly in the duchy of Cleves, and partly in Weſtphalia), and ſome other woods. On his march he was informed that the Marſi were celebrating a feſtival with great mirth and jollity. Upon this he advanced with ſuch expedition, that he ſurpriſed them in the midſt of their debauch; and giving his army full liberty to make what havock they pleaſed, a terrible maſſacre enſued, and the country was deſtroyed with fire and ſword for 50 miles round, without the loſs of a ſingle man on the part of the Romans.—This general maſſacre rouſed the Bructeri, the Tubantes, and the Eſipetes; who, beſetting the paſſes through which the Roman army was to return, fell upon their rear, and put them in to ſome diſorder; but the Romans ſoon recovered themſelves, and defeated the Germans with conſiderable loſs.

12 Exploits of Germanicus.

The following year (A. D. 16.), Germanicus taking advantage of ſome inteſtine broils which happened among the Catti, entered their country, where he put great numbers to the ſword. Moſt of their youth, however, eſcaped by ſwimming over the Adrana, now the Eder, and attempted to prevent the Romans from laying a bridge over that river: but being diſappointed in this, ſome of them ſubmitted to Germacicus, while the greater part abandoning their villages, rook refuge in the woods; ſo that the Romans, without oppoſition, ſet fire to all their villages, towns, &c. and having laid their capital in aſhes, began their march back to the Rhine.

Germanicus had ſcarce reached his camp, when he received a meſſage from Segeſtes, a German prince, in the intereſt of the Romans, acquainting him that he was beſieged in his camp by Arminius. On this advice, he inſtantly marched againſt the beſiegers; entirely defeated them; and took a great number of priſoners, among whom was Thuſneldis, the wife of Arminius, and daughter of Segeſtes, whom the former had carried off and married againſt her father's will. Arminius then, more enraged than ever, for the loſe of his wife whom he tenderly loved, ſtirred up all the neighbouring nations againſt the Romans. Germanicus, however, without being diſmayed by ſuch a formidable confederacy, prepared himſelf to oppoſe the enemy with vigour: but, that he might not be obliged to engage ſuch numerous forces at once, he detached his lieutenant Cæcina, at the head of 40 cohorts, into the territories of the Bructeri; while his cavalry, under the command of Pedo, entered the country of the Friſii. As for Germanicus himſelf, he embarked the remainder of his army, conſiſting of four legions, on a neighbouring lake; and tranſported them by rivers and canals to the place appointed on the river Ems, where the three bodies met. In their march they found the ſad remains of the legions conducted by Varus, which they buried with all the ceremony their circumſtances could admit. After this they advanced againſt Arminius, who retired and poſted himſelf advantageouſly cloſe to a wood. The Roman general followed him; and coming up with him, ordered his cavalry to advance and attack the enemy. Arminius, at their firſt approach, pretended to fly; but ſuddenly wheeled about, and giving the ſignal to a body of troops, whom he had concealed in the wood, to ruſh out, obliged the cavalry to give ground. The cohorts then advanced to their relief; but they too were put into diſorder, and would have been puſhed into a moraſs, had not Germanicus himſelf advanced with the reſt of the cavalry to their relief. Arminius did not think it prudent to engage theſe freſh troops, but retired in good order; upon which Germanicus alſo retired towards the Ems. Here he embarked with four legions, ordered Cæcina to reconduct the other four by land, and ſent the cavalry to the ſea-ſide, with orders to march along the ſhore to the Rhine. Tho' Cæcina was to return by roads well known, yet Germanicus adviſed him to paſs with all poſſible ſpeed, a cauſeway, called the *long bridges*; which led acroſs vaſt marſhes, ſurrounded on all ſides with woods and hills that gently roſe from the plain.

Arminius, however, having got notice of Cæcina's march, arrived at the long bridges before Cæcina, and filled the woods with his men, who, on the approach of the Romans, ruſhed out, and attacked them with great fury. The legions, not able to manage their arms in the deep waters and ſlippery ground, were obliged to yield; and would in all probability have been entirely defeated, had not night put an end to the combat. The Germans, encouraged by their ſucceſs, inſtead of refreſhing themſelves with ſleep, ſpent the whole night in diverting the courſes of the ſprings which roſe in the neighbouring mountains; ſo that, before day, the camp which the Romans had begun was laid under water, and their works were overturned. Cæcina was for ſome time at a loſs what to do; but at laſt reſolved to attack the enemy by day-break, and, having driven them to their woods, to keep them there in a manner beſieged, till the baggage and wounded men ſhould paſs the cauſeway, and get out of the enemy's reach. But when his army was drawn up, the legions poſted on the wings, ſeized with a ſudden panic, deſerted their ſtations, and occupied a field beyond the marſhes. Cæcina thought it adviſable to follow them; but the baggage ſtuck in the mire, as he attempted to croſs the marſhes, which greatly embarraſſed the ſoldiers. Arminius perceiving this, laid hold of the opportunity to begin the attack; and crying out, "This is a ſecond Varus, the ſame fate attends him and his legions," fell on the Romans with inexpreſſible fury. As he had ordered his men to aim chiefly at the horſes, great numbers of them were killed; and the ground becoming ſlippery with their blood and the ſlime of the marſh, the reſt either fell or threw their riders, and, galloping through the ranks, put them in diſorder. Cæcina diſtinguiſhed himſelf in a very eminent manner; but his horſe being killed, he would have been taken priſoner, had not the firſt legion reſcued him. The greedineſs of the enemy, however, ſaved the Romans from utter deſtruction; for juſt as the legions were quite ſpent, and on the point of yielding, the barbarians on a ſudden abandoned them in order to ſeize their baggage. During this reſpite, the Romans ſtruggled out of the marſh, and having gained the dry fields, formed a camp with all poſſible ſpeed, and fortified it in the beſt manner they could.

The Germans having loſt the opportunity of deſtroying the Romans, contrary to the advice of Arminius, attacked their camp next morning, but were repulſed with great ſlaughter; after which they gave Cæcina no more moleſtation till he reached the banks of the Rhine. Germanicus, in the mean time, having conveyed the legions he had with him down the river Ems into the ocean, in order to return by ſea to the river Rhine, and finding that his veſſels were overloaded, delivered the ſecond and 14th legions to Publius Vitellius, deſiring him to conduct them by land. But this march proved fatal to great numbers of them; who were either buried in the quickſands, or ſwallowed up by the overflowing of the tide, to which they were as yet utter ſtrangers. Thoſe who eſcaped, loſt their arms, utenſils, and proviſions; and paſſed a melancholy night upon an eminence which they had gained by wading up to the chin. The next morning the land returned with the tide of ebb; when Vitellius, by an haſty march, reached the river Uſingis, by ſome thought to be the Hoerenſter, on which the city of Groningen ſtands. There Germanicus, who had reached that river with his fleet, took the legions again on board, and conveyed them to the mouth of the Rhine, whence they all returned to Cologne, at a time when it was reported they were totally loſt.

13
His ſecond expedition.

This expedition, however, coſt the Romans very dear, and procured very few advantages. Great numbers of men had periſhed; and by far the greateſt part of thoſe who had eſcaped ſo many dangers returned without arms, utenſils, horſes, &c. half naked, lamed, and unfit for ſervice. The next year, however, Germanicus, bent on the entire reduction of Germany, made vaſt preparations for another expedition. Having conſidered the various accidents that had befallen him during the war, he found that the Germans were chiefly indebted for their ſafety to their woods and marſhes, their ſhort ſummers and long winters; and that his troops ſuffered more from their long and tedious marches than from the enemy. For this reaſon he reſolved to enter the country by ſea, hoping by that means to begin the campaign earlier, and ſurpriſe the enemy. Having therefore built with great diſpatch, during the winter, 1000 veſſels of different ſorts, he ordered them early in the ſpring (A. D. 16) to fall down the Rhine, and appointed the iſland of the Batavians for the general rendezvous of his forces. When the fleet was ſailing, he detached Silius one of his lieutenants, with orders to make a ſudden irruption into the country of the Catti; and, in the mean time, he himſelf, upon receiving intelligence that a Roman fort on the Luppias was beſieged, haſtened with ſix legions to its relief. Silius was prevented, by ſudden rains, from doing more than taking ſome ſmall booty, with the wife and daughter of Arpen king of the Catti; neither did thoſe who beſieged the fort wait the arrival of Germanicus. In the mean time, the fleet arriving at the iſland of the Batavians, the proviſions and warlike engines were put on board and ſent forward; ſhips were aſſigned to the legions and allies; and the whole army being embarked, the fleet entered the canal formerly cut by Druſus, and from his name called *Foſſa Druſiana*. Hence he ſailed proſperouſly to the mouth of the Ems; where, having landed his troops, he marched directly to the Weſer, where he found Arminius encamped on the oppoſite bank, and determined to diſpute his paſſage. The next day Arminius drew out his troops in order of battle: but Germanicus, not thinking it adviſable to attack them, ordered the horſe to ford over under the command of his lieutenants Stertinius and Emilius; who, to divide the enemy's forces, croſſed the river in two different places. At the ſame time Cariovalda, the leader of the Batavian auxiliaries, croſſed the river where it was moſt rapid: but, being drawn into an ambuſcade, he was killed, together with moſt of the Batavian nobility; and the reſt would have been totally cut off, had not Stertinius and Emilius haſtened to their aſſiſtance. Germanicus in the mean time paſſed the river without moleſtation. A battle ſoon after enſued; in which the Germans were defeated with ſo great a ſlaughter that the ground was covered with arms and dead bodies for more than 10 miles round: and among the ſpoils taken on this occaſion, were found, as formerly, the chains with which the Germans had hoped to bind their captives.

In memory of this ſignal victory Germanicus raiſed a mount, upon which he placed as trophies the arms of the enemy, and inſcribed underneath the names of the conquered nations. This ſo provoked the Germans, though already vanquiſhed and determined to abandon their country, that they attacked the Roman army unexpectedly on its march, and put them into ſome diſorder. Being repulſed, they encamped between a river and a large foreſt ſurrounded by a marſh except on one ſide, where it was incloſed by a broad rampart formerly raiſed by the Angrivarii as a barrier between them and the Cheruſci. Here another battle enſued; in which the Germans behaved with great bravery, but in the end were defeated with great ſlaughter.

14
His fleet diſperſed by a ſtorm.

After this ſecond defeat, the Angrivarii ſubmitted, and were taken under the protection of the Romans, and Germanicus put an end to the campaign. Some of the legions he ſent to their winter-quarters by land, while he himſelf embarked with the reſt on the river Ems, in order to return by ſea. The ocean proved at firſt very calm, and the wind favourable: but all of a ſudden a ſtorm ariſing, the fleet, conſiſting of 1000 veſſels, was diſperſed: ſome of them were ſwallowed up by the waves; others were daſhed in pieces againſt the rocks, or driven upon remote and inhoſpitable iſlands, where the men either periſhed by famine, or lived upon the fleſh of the dead horſes with which the ſhores ſoon appeared ſtrewed; for, in order to lighten their veſſels, and diſengage them from the ſhoals, they had been obliged to throw overboard their horſes and beaſts of burden, nay, even their arms and baggage. Moſt of the men, however, were ſaved, and even great part of the fleet recovered. Some of them were driven upon the coaſt of Britain; but the petty kings who reigned there generouſly ſent them back.

On the news of this misfortune, the Catti, taking new courage, ran to arms; but Caius Silius being detached againſt them with 30,000 foot and 3000 horſe, kept them in awe. Germanicus himſelf, at the head of a numerous body, made a ſudden irruption into the territories of the Marſi, where he recovered one of Varus's eagles, and having laid waſte the country, he returned to the frontiers of Germany, and put his troops into winter-quarters; whence he was ſoon recalled by Tiberius, and never ſuffered to return into Germany again.

15
Death of Arminius.

After the departure of Germanicus, the more northern nations of Germany were no more moleſted by the Romans. Arminius carried on a long and ſucceſsful war with Maroboduus king of the Marcomanni, whom he at laſt expelled, and forced to apply to the Romans for aſſiſtance; but, excepting Germanicus, it ſeems they had at this time no other general capable of oppoſing Arminius, ſo that Maroboduus was never reſtored. After the final departure of the Romans, however, Arminius having attempted to enſlave his country, fell by the treachery of his own kindred. The Germans held his memory in great veneration; and Tacitus informs us, that in his time they ſtill celebrated him in their ſongs.

Nothing remarkable occurs in the hiſtory of Germany from this time till the reign of the emperor Claudius. A war indeed is ſaid to have been carried on by Lucius Domitius, father to the emperor Nero. But of his exploits we know nothing more than that he penetrated beyond the river Elbe, and led his army farther into the country than any of the Romans had ever done. In the reign of Claudius, however, the German territories were invaded by Cn. Domitius Corbula, one of the greateſt generals of his age. But when he was on the point of forcing them to ſubmit to the Roman yoke, he was recalled by Claudius, who was jealous of the reputation he had acquired.

16
The Dacians invade the Roman empire.

In the reign of Veſpaſian, a terrible revolt happened among the Batavians and thoſe German nations who had ſubmitted to the Romans; a particular account of which is given under the article Rome. The revolters were with difficulty ſubdued: but, in the reign of Domitian, the Dacians invaded the empire, and proved a more terrible enemy than any of the other German nations had been. After ſeveral defeats, the emperor was at laſt oblidged to conſent to pay an annual tribute to Decebalus king of the Dacians; which continued to the time of Trajan. But this warlike prince refuſed to pay tribute; alleging, when it was demanded of him, that "he had never been conquered by Decebalus." Upon this the Dacians paſſed the Danube, and began to commit hoſtilities in the Roman territories. Trajan, glad of this opportunity to humble an enemy whom he began to fear, drew together a mighty army, and marched with the utmoſt expedition to the banks of the Danube. As Decebalus was not appriſed of his arrival, the emperor paſſed the river without oppoſition, and entering Dacia, laid waſte the country with fire and ſword. At laſt he was met by Decebalus with a numerous army. A bloody engagement enſued, in which the Dacians were defeated; though the victory coſt the Romans dear: the wounded were ſo numerous, that they wanted linen to bind up their wounds; and to ſupply the defect, the emperor generouſly devoted his own wardrobe. After the victory, he purſued Decebalus from place to place, and at laſt obliged him to conſent to a peace on the following terms: 1. That he ſhould ſurrender the territories which he had unjuſtly taken from the neighbouring nations. 2. That he ſhould deliver up his arms, his warlike engines, with the artificers who made them, and all the Roman deſerters. 3. That for the future he ſhould entertain no deſerters, nor take into his ſervice the natives of any country ſubject to Rome. 4. That he ſhould diſmantle all his fortreſſes, caſtles, and ſtrong-holds. And, laſtly, that he ſhould have the ſame friends and foes with the people of Rome.

With theſe hard terms Decebalus was obliged to comply, though ſore againſt his will; and being introduced to Trajan, threw himſelf on the ground before him, acknowledging himſelf his vaſſal: after which the latter, having commanded him to ſend deputies to the ſenate for the ratification of the peace, returned to Rome.

This peace was of no long duration. Four years after (A. D. 105), Decebalus, unable to live in ſervitude as he called it, began, contrary to the late treaty, to raiſe men, provide arms, entertain deſerters, fortify his caſtles, and invite the neighbouring nations to join him againſt the Romans as a common enemy. The Scythians hearkened to his ſolicitations; but the Jazges, a neighbouring nation, refuſing to bear arms againſt Rome, Decebalus invaded their country. Hereupon Trajan marched againſt him; but the Dacian, finding himſelf unable to withſtand him by open force, had recourſe to treachery, and attempted to get the emperor murdered. His deſign, however, proved abortive, and Trajan purſued his march into Dacia. That his troops might the more readily paſs and repaſs the Danube, he built a bridge over that river; which by the ancients is ſtyled the moſt magnificent and wonderful of all his works *. To guard the bridge, he ordered two caſtles to be built; one on this ſide the Danube, and the other on the oppoſite ſide; and all this was accompliſhed in the ſpace of one ſummer. Trajan, however, as the ſeaſon was now far advanced, did not think it adviſable to enter Dacia this year, but contented himſelf with making the neceſſary preparations.

19
They are ſubdued by Trajan.

In the year 106, early in the ſpring, Trajan ſet out for Dacia; and having paſſed the Danube on the bridge he had built, reduced the whole country, and would have taken Decebalus himſelf had he not put an end to his own life, in order to avoid falling into the hands of his enemies. After his death the kingdom of Dacia was reduced to a Roman province; and ſeveral caſtles were built in it, and garriſons placed in them, to keep the country in awe.

18
Marcomanni and Quadi formidable to the empire.

After the death of Trajan, the Roman empire began to decline, and the northern nations to be daily more and more formidable. The province of Dacia indeed was held by the Romans till the reign of Gallienus; but Adrian, who ſucceeded Trajan, cauſed the arches of the bridge over the Danube to be broken down, leſt the barbarians ſhould make themſelves maſters of it, and invade the Roman territories. In the time of Marcus Aurelius, the Marcomanni and Quadi invaded the empire, and gave the emperor a terrible overthrow. He continued the war, however, with better ſucceſs afterwards, and invaded their country in his turn. It was during the courſe of this war that the Roman army is ſaid to have been ſaved from deſtruction by that miraculous event related under the article CHRISTIANS, p. 717. col. 2.

In the end, the Marcomanni and Quadi were, by repeated defeats, brought to the verge of deſtruction; inſomuch that their country would probably have been reduced to a Roman povince, had not Marcus Aurelius been diverted from purſuing his conqueſts by the revolt of one of his generals. After the death of Marcus Aurelius, the Germanic nations became every day more and more formidable to the Romans. Far from being able to invade and attempt the conqueſt of theſe northern countries, the Romans had the greateſt difficulty to repreſs the incurſions of their inhabitants. But for a particular account of their various invaſions of the Roman empire, and its total deſtruction by them at laſt, ſee the article ROME.

19
Roman empire deſtroyed by the Heruli.

The immediate deſtroyers of the Roman empire were the Heruli; who, under their leader Odoacer, dethroned Auguſtus the laſt Roman emperor, and proclaimed Odoacer king of Italy. The Heruli were ſoon expelled by the Oſtrogoths; and theſe in their turn were ſubdued by Juſtinian, who re-annexed Italy to the eaſtern empire. But the popes found means to obtain the temporal as well as ſpiritual juriſdiction over a conſiderable part of the country, while the Lombards ſubdued the reſt. The laſt proved very troubleſome to the popes, and at length beſieged Adrian I. in his capital. In this diſtreſs he applied to Charles the Great king of France; who conquered both Italy and Germany, and was crowned emperor of the weſt in 800.

20
Hiſtory of Germany ſince the time of Charlemagne.

The poſterity of Charlemagne inherited the empire of Germany until the year 880; at which time the different princes aſſumed their original independence, rejected the Carlovinian line, and placed Arnulph king of Bohemia on the throne. Since this time, Germany has ever been conſidered as an elective monarchy. Princes of different families, according to the prevalence of their intereſt and arms, have mounted the throne. Of theſe the moſt conſiderable, until the Auſtrian line acquired the imperial power, were the houſes of Saxony, Franconia, and Swabia. The reigns of theſe emperors contain nothing more remarkable than the conteſts between them and the popes; for an account of which, ſee the article ITALY. From hence, in the beginning of the 13th century, aroſe the factions of the Guelphs and Gibelines, of which the former was attached to the popes, and the latter to the emperor; and both, by their virulence and inveteracy, tended to diſquiet the empire for ſeveral ages. The emperors too were often at war with the infidels; and ſometimes, as happens in all elective kingdoms, with one another, about the ſucceſſion.

But what more deſerves our attention is the progreſs of government in Germany, which was in ſome meaſure oppoſite to that of the other kingdoms of Europe. When the empire raiſed by Charlemagne fell aſunder, all the different independent princes aſſumed the right of election; and thoſe now diſtinguiſhed by the name of *electors* had no peculiar or legal influence in appointing a ſucceſſor to the imperial throne; they were only the officers of the king's houſehold, his ſecretary, his ſteward, chaplain, marſhal, or maſter of his horſe, &c. By degrees, however, as they lived near the king's perſon, and held like all other princes, independent territories belonging to them, they increaſed their influence and authority; and in the reign of Otho III. 984, acquired the ſole right of electing the emperor. Thus while in the other kingdoms of Europe, the dignity of the great lords, who were all originally allodial or independent barons, was diminiſhed by the power of the king, as in France, and by the influence of the people, as in Great Britian; in Germany, on the other hand, the power of the electors was raiſed upon the ruins of the emperor's ſupremacy, and of the people's juriſdiction. In 1440, Frederic III. duke of of Auſtria was elected emperor, and the imperial dignity continued in the male line of that family for 300 years. His ſucceſſor Maximilian married the heireſs of Charles duke of Burgundy; whereby Burgundy and the 17 provinces of the Netherlands were annexed to the houſe of Auſtria. Charles V. grandſon of Maximilian, and heir to the kingdom of Spain, was elected emperor in the year 1519. Under him MEXICO and PERU were conquered by the Spaniards; and in his reign happened the REFORMATION in ſeveral parts of Germany; which, however, was not confirmed by public authority till the year 1648, by the treaty of Weſtphalia, and in the reign of Ferdinand III. The reign of Charles V. was continually diſturbed by his wars with the German princes and the French king Francis I. Though ſucceſsful in the beginning of his reign, his good fortune towards the concluſion of it began to forſake him; which with other reaſons, occaſioned his abdication of the crown. See CHARLES V.

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* See *Architecture*, n° 139.

His brother Ferdinand I. who in 1558 ſucceeded to the throne, proved a moderate prince with regard to religion. He had the addreſs to get his ſon Maximilian declared king of the Romans in his own lifetime, and died in 1564. By his laſt will he ordered, that if either his own male iſſue, or that of his brother Charles, ſhould fail, his Auſtrian eſtates ſhould revert to his ſecond daughter Anne, wife to the elector of Bavaria, and her iſſue. We mention this deſtination, as it gave riſe to the late oppoſition made by the houſe of Bavaria to the pragmatic ſanction, in favour of the empreſs queen of Hungary, on the death of her father Charles VI. The reign of Maximilian II. was diſturbed with internal commotions, and an invaſion from the Turks; but he died in peace in 1576. He was ſucceeded by his ſon Rodolph; who was involved in wars with the Hungarians, and in differences with his brother Matthias, to whom he ceded Hungary and Auſtria in his lifetime. He was ſucceeded in the empire by Matthias; under whom the reformers, who went under the names of *Lutherans* and *Calviniſts*, were ſo much divided among themſelves, as to threaten the empire with a civil war. The ambition of Matthias at laſt tended to reconcile them; but the Bohemians revolted, and threw the imperial commiſſaries out of a window at Prague. This gave riſe to a ruinous war, which laſted 30 years. Matthias thought to have exterminated both parties; but they formed a confederacy, called the *Evangelic League*, which was counterbalanced by a Catholic league.

Matthias dying in 1618, was ſucceeded by his couſin Ferdinand II.; but the Bohemians offered their crown to Frederic the elector Palatine, the moſt powerful Proteſtant prince in Germany, and ſon-in-law to his Britannic majeſty James I. That prince was incautious enough to accept of the crown: but he loſt it, by being entirely defeated by the duke of Bavaria and the imperial generals at the battle of Prague; and he was even deprived of his electorate, the beſt part of which was given to the duke of Bavaria. The Proteſtant princes of Germany, however, had among them at this time many able commanders, who were at the head of armies, and continued the war with wonderful obſtinacy: among them were the margrave of Baden Durlach, Chriſtian duke of Brunſwic, and count Mansfield; the laſt was one of the beſt generals of the age. Chriſtian IV. king of Denmark declared for them; and Richlieu, the French miniſter, was not fond of ſeeing the houſe of Auſtria aggrandized. The emperor, on the other hand, had excellent generals; and Chriſtian, having put himſelf at the head of the evangelic league, was defeated by Tilly, an Imperialiſt of great reputation in war. Ferdinand made ſo moderate a uſe of his advantages obtained over the Proteſtants, that they formed a freſh confederacy at Leipſic, of which the celebrated Guſtavus Adolphus king of Sweden was the head. An account of his glorious victories is given under the article SWEDEN. At laſt he was killed at the battle of Lutzen in 1632. But the Proteſtant cauſe did not die with him. He had brought up a ſet of heroes, ſuch as the duke of Saxe Weimer, Torſtenſon, Banier, and others, who ſhook the Auſtrian power; till, under the mediation of Sweden, a general peace was concluded among all the belligerent powers, at Munſter, in the year 1648; which forms the baſis of the preſent political ſyſtem of Europe.

Ferdinand II. was ſucceeded by his ſon Ferdinand III. This prince died in 1657; and was ſucceeded by the emperor Leopold, a ſevere, unamiable, and not very fortunate prince. He had two great powers to contend with, France on the one ſide, and the Turks on the other; and was a loſer in his war with both. Louis XIV. at that time king of France, was happy in having the two celebrated generals Condé and Turenne in his ſervice. The latter had already diſtinguiſhed himſelf by great exploits againſt the Spaniards; and, on the acceſſion of Leopold, the court of France had taken the opportunity of confirming the treaty of Munſter, and attaching to her intereſt ſeveral of the independent princes of Germany. The tranquillity which now took place, however, was not eſtabliſhed upon any permanent baſis. War with Spain was reſumed in the year 1668: and the great ſucceſs of Turenne in the Netherlands ſtimulated the ambition of the prince of Condé to attempt the conqueſt of Franche Compte at that time under the protection of the houſe of Auſtria. This was accompliſhed in three weeks: but the rapid ſucceſs of Louis had awakened the jealouſy of his neighbours to ſuch a degree, that a league was formed againſt him by England, Holland, and Sweden; and the French monarch, dreading to enter the liſts with ſuch formidable enemies, conſented to the treaty of Aix-la-Chapelle, by which, among other articles, Franche Compte was reſtored. The flames of war, however, were renewed by the inſatiable ambition of the French monarch; who, having entered ed into an alliance with Charles II. of England, aimed at nothing leſs than the total overthrow of the Dutch republic. The events of that war are related under the article UNITED PROVINCES: here it is ſufficient to obſerve, that the misfortunes of the Dutch excited the compaſſion of the emperor and court of Spain, who now openly declared themſelves their allies. Turenne was oppoſed by the prince of Orange in conjunction with the celebrated imperial general Montecuculi, whoſe artful conduct eluded even the penetration of Turenne, and he ſat down ſuddenly before the city of Bonne. Here he was joined by the prince of Orange, who had likewiſe found means to elude the vigilance of the French generals. Bonne ſurrendered in a ſhort time, and ſeveral other places of Cologne fell into the hands of the allies; who likewiſe cut off the communication betwixt France and the United Provinces; ſo that Louis was ſoon obliged to recall his armies, and abandon all his conqueſts with greater rapidity than they had been made. In 1674 he was abandoned by his ally Charles II. of England, and the biſhop of Munſter and elector of Cologne were compelled to renounce their allegiance to him; but notwithſtanding theſe misfortunes, he continued every where to make head againſt his enemies, and even meditated new conqueſts. With a powerful army he again invaded Franche Compte in perſon, and in ſix weeks reduced the whole province to his obedience. In Alſace, Turenne defeated the imperial general at Sintzheim, and ravaged the palatinate. Seventy thouſand Germans were ſurpriſed: a conſiderable detachment was cut in pieces at Mulhauſen; the elector of Brandenburg, who had been intruſted with the chief command, was routed by Turenne near Colmar; a third body met with a ſimilar fate at Turkheim; and the whole German forces were obilged at laſt to evacuate the province and repaſs the Rhine.

In conſequence of theſe diſaſters the Imperial general Montecuculi was recalled to act againſt Turenne. The military ſkill of the two commanders ſeemed to be nearly equal; but before the ſuperiority could be adjudged to either, Turenne was killed by a cannon ball as he was reconnoitring a ſituation for erecting a battery. By his death the Imperialiſts obtained a decided ſuperiority. Montecuculi penetrated into Alſace; and the French, under de Lorges nephew to the deceaſed general, were happy in being able to eſcape a defeat.

Part of the German army now ſat down before Treves, where they were oppoſed by Mareſchal Crequi; but the negligence of that general expoſed him to ſuch a dreadful defeat, that he was obliged to fly into the city with only four attendants. Here he endeavoured in vain to animate the people to a vigorous defence. The garriſon mutinied againſt his authority; and, when he refuſed to ſign the capitulation they made, delivered him up priſoner to the enemy. Louis in the mean time had taken the field in perſon againſt the prince of Orange; but the diſaſtrous ſtate of affairs in Germany induced him to recall the prince of Condé to make head againſt Montecuculi. In this campaign the prince ſeemed to have the advantage. He compelled the Germans to raiſe the ſieges of Hagenau and Saverne; and at laſt to repaſs the Rhine without having been able to force him to a battle.

This was the laſt campaign made by theſe celebrated commanders; both of them now, contented with the fame they had acquired, retiring from the field to ſpend the remainder of their days in peace. The excellent diſcipline, however, which the two great French generals had introduced into their armies, ſtill continued to make them very formidable, though it did not always inſure them a victory. In Germany, the duke of Lorrian, who had recovered Philipſburgh, was repeatedly defeated by Mareſchal Crequi, who had been ranſomed from his captivity, and become more prudent by his defeat. In Flanders, the prince of Orange was overmatched by the duke of Orleans and Marſhal Luxemburg. A peace was at length concluded at Nimeguen in 1679, by which the king of France ſecured himſelf Franche Compte with a great many cities in the Netherlands; while the king of Sweden was reinſtated in thoſe places of which he had been ſtripped by the Danes and Germans. This tranquillity, however, was of no long duration. Louis employed every moment in preparations for new conqueſts; poſſeſſed himſelf of the imperial city of Straſburgh by treachery; and diſpoſſeſſed the elector Palatine and the elector of Treves of the lordſhips of Falkemburg, Germanſheim, and Valdentz. On the moſt frivolous pretences he had demanded Aloſt from the Spaniards; and on their refuſal, ſeized upon Luxemburg. His conduct, in ſhort, was ſo intolerable that the prince of Orange, his inveterate enemy, found means to unite the whole empire in a league againſt him. Spain and Holland became parties in the ſame cauſe; and Sweden and Denmark ſeemed alſo inclined to accede to the general confederacy. Notwithſtanding this formidable combination, however, Louis ſeemed ſtill to have the advantage. He made himſelf maſter of the cities of Philipſburgh, Manheim, Frankendal, Spires, Worms, and Oppenheim; the fruitful country of the palatinate was ravaged in a dreadful manner; the towns were reduced to aſhes; and the people, driven from their habitations, were every where left to periſh through the inclemency of the weather and want of proviſions. By this cruelty his enemies were rather exaſperated than vanquiſhed: the Imperaliſts, under the conduct of the duke of Lorrain, reſumed their courage, and put a ſtop the French conqueſts. At length all parties, weary of a deſtructive war, conſented to the treaty of Ryſwick in 1697. By this treaty Louis gave up to the empire, Fribourg, Briſac, Kheil, and Philipſburg: he conſented alſo to deſtroy the fortifications of Straſburg. Fort Louis and Traerbach, the works of which had exhauſted the ſkill of the great Vauban, with Lorrain, Treves, and the Palatinate, were reſigned to their reſpective princes; inſomuch that the terms to which the French monarch now conſented, after ſo many victories, were ſuch as could ſcarce have been expected under the preſſure of the greateſt misfortunes. The views of Louis, however, in conſenting to this apparently humiliating treaty, were beyond the views of ordinary politicians. The health of the king of Spain was in ſuch a declining way, that his death appeared to be at hand; and Louis now reſolved to renew his pretenſions to that kingdom, which he had formerly by treaty ſolemnly renounced. His deſigns in this reſpect could not be concealed from the vigilance of

William III. of Britain; of which Louis being ſenſible, and knowing that the emperor had claims of the ſame nature on Spain, he thought proper to enter into a very extraordinary treaty with William. This was no leſs than the partition of the whole Spaniſh dominions, which were now to be diſtributed in the following manner. To the young prince of Bavaria were to be aſſigned Spain and the Eaſt Indies; the dauphin, ſon to Louis, was to have Naples, Sicily, and the province of Guipuſcoa; while the Archduke Charles, ſon to the Emperor Leopold, was to have only the duchy of Milan. By this ſcandalous tready the indignation of Charles was rouſed, ſo that he bequeathed the whole of his dominions to the prince of Bavaria. This ſcheme, however, was diſconcerted by the ſudden death of the prince; upon which a new treaty of partition was concluded between Louis and William. By this the kingdom of Spain, together with the Eaſt India territories, were to be beſtowed on the Archduke Charles, and the duchy of Milan upon the duke of Lorrain. The laſt moments of the Spaniſh monarch were diſturbed by the intrigues of the rival houſes of Auſtria and Bourbon; but the haughtineſs of the Auſtrian miniſters ſo diſguſted thoſe of Spain, that they prevailed upon their dying monarch to make a new will. By this the whole of his dominions were bequeathed to Philip duke of Anjou, grandſon to the king of France; and Louis, prompted by his natural ambition, accepted the kingdom bequeathed to his grandſon, excuſing himſelf to his allies in the beſt manner he could for departing from his engagements with them. For this, however, he was made to pay dear. His inſatiable ambition and his former ſucceſſes had alarmed all Europe. The Emperor, the Dutch, and the king of England, entered into a new confederacy againſt him; and a bloody war enſued, which threatened to overthrow the French monarchy entirely. While this war (of which an account is given under the article BRITAIN) was carried on with ſuch ſucceſs, the Emperor Leopold died in the year 1705.

He was ſucceeded by his ſon Joſeph, who put the electors of Cologne and Bavaria to the ban of the empire; but being ill ſerved by Prince Louis of Baden general of the empire, the French partly recovered their affairs, nothwithſtanding their repeated defeats. The duke of Marlborough had not all the ſucceſs he expectedor deſerved. Joſeph himſelf was ſuſpected of a deſign to ſubvert the Germanic liberties; and it was plain by his conduct, that he expected England ſhould take the labouring oar in the war, which was to be entirely carried on for his benefit. The Engliſh were diſguſted at his ſlowneſs and ſelfiſhneſs: but he died in 1711, before he had reduced the Hungarians; and leaving no male iſſue, he was ſucceeded in the empire by his brother Charles VI. whom the allies were endeavouring to place on the throne of Spain, in oppoſition to Philip duke of Anjou, grandſon to Louis XIV.

When the peace of Utrecht took place in 1713, Charles at firſt made a ſhow as if he would continue the war; but he found himſelf unable, now that he was forſaken by the Engliſh. He therefore was obliged to conclude a peace with France at Baden in 1714, that he might attend the progreſs of the Turks in Hungary; where they received a total defeat from Prince Eugene at the battle of Peterwaradin. They received another of equal importance from the ſame general in 1717, before Belgrade, which fell into the hands of the Imperialiſts; and next year the peace of Paſſarowitz, between them and the Turks, was concluded. Charles employed every minute of his leiſure in making arrangements for increaſing and preſerving his hereditary dominions in Italy and the Mediterranean. Happily for him, the crown of Britain devolved to the houſe of Hanover; an event which gave him a very deciſive weight in Europe, by the connections between George I. and II. and the empire. Charles was ſenſible of this; and carried matters with ſo high a hand, that, about the years 1724 and 1725, a breach enſued between him and George I. and ſo unſteady was the ſyſtem of affairs all over Europe at that time, that the capital powers often changed their old alliances, and concluded new ones contradictory to their intereſt. Without entering into particulars, it is ſufficient to obſerve, that the ſafety of Hanover, and its aggrandizement, was the main object of the Britiſh court; as that of the emperor was the eſtabliſhment of the pragmatic ſanction in favour of his daughter the (late empreſs-queen), he having no male iſſue. Mutual conceſſions upon thoſe great points reſtored a good underſtanding between George II. and the emperor Charles; and the elector of Saxony, flattered with the view of gaining the throne of Poland, relinquiſhed the great claims he had upon the Auſtrian ſucceſſion.

The emperor, after this, had very bad ſucceſs in a war he entered into with the Turks, which he had undertaken chiefly to indemnify himſelf for the great ſacrifices he had made in Italy to the princes of the houſe of Bourbon. Prince Eugene was then dead, and he had no general to ſupply his place. The ſyſtem of France, however, under cardinal Fleury, happened at that time to be pacific; and ſhe obtained for him, from the Turks, a better peace than he had reaſon to expect. Charles, to keep the German and other powers eaſy, had, before his death, given his eldeſt daughter, the late empreſs-queen, in marriage to the duke of Lorrain, a prince who could bring no acceſſion of power to the Auſtrian family.

Charles died in 1740; and was no ſooner in the grave, than all he had ſo long laboured for muſt have been overthrown, had it not been for the firmneſs of George II. The young king of Pruſſia entered and conquered Sileſia, which he ſaid had been wrongfully diſmembered from his family. The king of Spain and the elector of Bavaria ſet up claims directly incompatible with the pragmatic ſanction, and in this they were joined by France; though all thoſe powers had ſolemnly guaranteed it. The imperial throne, after a conſiderable vacancy, was filled up by the elector of Bavaria, who took the title of *Charles VII.* in January 1742. The French poured their armies into Bohemia, where they took Prague; and the queen of Hungary, to take off the weight of Pruſſia, was forced to cede to that prince the moſt valuable part of the duchy of Sileſia by a formal treaty.

Her youth, her beauty, and ſufferings, and the noble fortitude with which ſhe bore them, touched the hearts of the Hungarians, into whoſe arms ſhe threw herſelf and her little ſon; and though they had been always remarkable for their diſaffection to the houſe of Auſtria, they declared unanimouſly in her favour. Her generals drove the French out of Bohemia; and George II. at the head of an Engliſh and Hanoverian army, gained the battle of Dettingen, in 1743. Charles VII. was at this time miſerable on the imperial throne, and would have given the queen of Hungary almoſt her own terms; but ſhe haughtily and impolitically rejected all accommodation, though adviſed to it by his Britannic majeſty, her beſt and indeed only friend. This obſtinacy gave a colour for the king of Pruſſia to invade Bohemia, under pretence of ſupporting the imperial dignity; but though he took Prague, and ſubdued the greateſt part of the kingdom, he was not ſupported by the French; upon which he abandoned all his conqueſts, and retired into Sileſia. This event confirmed the obſtinacy of the queen of Hungary; who came to an accommodation with the emperor, that ſhe might recover Sileſia. Soon after, his Imperial majeſty, in the beginning of the year 1745, died; and the duke of Lorrain, then grand duke of Tuſcany, conſort to the queen of Hungary, after ſurmounting ſome difficulties, was choſen emperor.

The bad ſucceſs of the allies againſt the French and Bavarians in the Low Countries, and the loſs of the battle of Fontenoy, retarded the operations of the empreſs-queen againſt his Pruſſian majeſty. The latter beat the emperor's brother, Prince Charles of Lorrain, who had before driven the Pruſſians out of Bohemia; and the conduct of the empreſs-queen was ſuch, that his Britannic majeſty thought proper to guarantee to him the poſſeſſion of Sileſia, as ceded by treaty. Soon after, his Pruſſian Majeſty pretended that he had diſcovered a ſecret convention which had been entered into between the empreſs-queen, the empreſs of Ruſſia, and the king of Poland as elector of Saxony, to ſtrip him of his dominions, and to divide them among themſelves. Upon this his Pruſſian majeſty, very ſuddenly, drove the king of Poland out of Saxony, defeated his troops, and took poſſeſſion of Dreſden; which he held till a treaty was made under the mediation of his Britannic majeſty, by which the king of Pruſſia acknowledged the duke of Lorrain, great duke of Tuſcany, for emperor. The war, however, continued in the Low Countries, not only to the diſadvantage, but to the diſcredit, of the Auſtrians and Dutch, till it was finiſhed by the treaty of Aix-la-Chapelle, in April 1758. By that treaty Sileſia was once more guaranteed to the king of Pruſſia. It was not long before that monarch's jealouſies were renewed and verified; and the empreſs of Ruſſia's views falling in with thoſe of the empreſs-queen and the king of Poland, who were unnaturally ſupported by France in their new ſchemes, a freſh war was kindled in the empire. The king of Pruſſia declared againſt the admiſſion of the Ruſſians into Germany, and his Britannic majeſty againſt that of the French. Upon thoſe two principles all former differences between theſe monarchs were forgotten, and the Britiſh parliament agreed to pay an annual ſubſidy of 670,000l. to his Pruſſian majeſty during the continuance of the war.

The flames of war now broke out in Germany with greater fury and more deſtructive violence than ever. The armies of his Pruſſian majeſty, like an irreſiſtible torrent, burſt in Saxony; totally defeated the imperial general Brown at the battle of Lowoſitz; forced the Saxons to lay down their arms, though almoſt impregnably fortified at Pirna; and the elector of Saxony fled to his regal dominions in Poland. After this, his Pruſſian majeſty was put to the ban of the empire; and the French poured, by one quarter, their armies, as the Ruſſians did by another, into the empire. The conduct of his Pruſſian majeſty on this occaſion is the moſt amazing that is to be met with in hiſtory; for a particular account of which, ſee the article PRUSSIA.

At laſt, however, the taking of Colberg by the Ruſſians, and of Schweidnitz by the Auſtrians, was on the point of completing his ruin, when his moſt formidable enemy, the empreſs of Ruſſia, died, January 5th 1762; George II. his only ally, had died on the 25th of October 1760.

The deaths of thoſe illuſtrious perſonages were followed by great conſequences. The Britiſh miniſtry of George III. ſought to finiſh the war with honour, and the new emperor of Ruſſia recalled his armies. His Pruſſian majeſty was, notwithſtanding, ſo very much reduced by his loſſes, that the empreſs-queen, probably, would have completed his deſtruction, had it not been for the wiſe backwardneſs of other German princes, not to annihilate the houſe of Brandenburg. At firſt the empreſs-queen rejected all terms propoſed to her, and ordered 30,000 men to be added to her armies. The viſible backwardneſs of her generals to execute her orders, and new ſucceſſes obtained by his Pruſſian majeſty, at leaſt prevailed on her to agree to an armiſtice, which was ſoon followed by the treaty of Hubertſburgh, which ſecured to his Pruſſian Majeſty the poſſeſſion of Sileſia. Upon the death of the emperor her huſband, in 1765, her ſon Joſeph, who had been crowned king of the Romans in 1764, ſucceeded him in the empire.

This prince ſhowed an active and reſtleſs diſpoſition, much inclined to extend his territories by conqueſt, and to make reformations in the internal policy of his diminions, yet without taking any proper methods for accompliſhing his purpoſes. Hence he was almoſt always diſappointed; inſomuch that he wrote for himſelf the following epitaph: "Here lies Joſeph, unfortunate in all his undertakings." In the year 1788, a war commenced betwixt him and the king of Pruſſia; in which, notwithſtanding the impetuous valour of that monarch, Joſeph acted with ſuch caution that his adverſary could gain no advantage over him; and an accommodation took place without any remarkable exploit on either ſide. In 1781 he took the opportunity of the quarrel betwixt Britain and the United Provinces, to deprive the latter of the barrier towns which had been ſecured to them by the treaty of Utrecht. Theſe indeed had frequently been of great uſe to the Houſe of Auſtria in its ſtate of weakneſs; but Joſeph, conſcious of his own ſtrength, looked upon it as derogatory to his honour to allow ſo many of his cities to remain in the hands of foreigners, and to be garriſoned at his expence. As at that time the Dutch were unable to reſiſt, the Imperial orders for evacuating the barrier towns were inſtantly complied with; nor did the court of France, though then in friendſhip with Holland, make any offer to interpoſe. Encouraged by this ſucceſs, Joſeph next demanded the free navigation of the Scheldt; but as this would evidently have been very detrimental to the commercial intereſts of Holland, a flat refuſal was given to his requiſitions. In this the emperor was much diſappointed; having flattered himſelf that the Hollanders, intimidated by his power, would yield the navigation of the river as eaſily as they had done the barrier. Great preparations were made by the emperor, which the Dutch, on their part, ſeemed determined to reſiſt. But while the emperor appeared ſo much ſet upon this acquiſition, he ſuddenly abandoned the project entirely, and entered into a new ſcheme of exchanging the Netherlands for the duchy of Bavaria. This was oppoſed by the king of Pruſſia; and by the interference of the court of France, the emperor found himſelf at laſt obliged alſo to abandon his other ſcheme of obtaining the navigation of the Scheldt. A treaty of peace was concluded, under the guarantee of his moſt Chriſtian majeſty. The principal articles were, that the States acknowledged the emperor's ſovereignty over the Scheldt from Antwerp to the limits of Seftingen; they agreed to demoliſh certain forts, and to pay a conſiderable ſum of money in lieu of ſome claims which the emperor had on Maeſtright, and by way of indemnification for laying part of his territories under water.

The treaty with the Dutch was no ſooner concluded than a quarrel with the Turks took place, which terminated in an open war. It does not appear that the emperor had at this time any real provocation, but ſeems to have acted merely in conſequence of his engagements with Ruſſia to reduce the dominions of the Grand Signior. All theſe foreign engagements, however, did not in the leaſt retard the progreſs of reformation which the emperor carried on throughout his dominions with a rapidity ſcarcely to be matched, and which at laſt produced the revolt of the Auſtrian Netherlands. In the courſe of his labours in this way a complete code of laws was compiled. Theſe were at firſt greatly commended for their humanity, as excluding almoſt entirely every ſpecies of capital puniſhment; yet, when narrowly conſidered, the commutations were found to be ſo exceedingly ſevere, that the moſt cruel death would, comparatively ſpeaking, have been an act of mercy. Even for ſmaller crimes the puniſhments were ſevere beyond meaſure; but the greateſt fault of all was, that the modes of trial were very defective, and the puniſhments ſo arbitrary, that the moſt perfect and innocent character lay at the mercy of a tyrannical judge. The innovations in eccleſiaſtical matters were, however, moſt offenſive to his ſubjects in the Netherlands. Among the many changes introduced into this department, the following were ſome of the moſt remarkable. 1. An abridgement of divine ſervice. 2. A total ſuppreſſion of vocal performers in choirs. 3. The introduction of the vernacular language inſtead of the Latin in adminiſtering the ſacraments. 4. The prohibition of chanting hymns in private houſes. 5. The ſuppreſſion of a great number of religious houſes, and the reduction of the number of the clergy. 6. The total abolition of the papal ſupremacy throughout the Imperial dominions. The ſame ſpirit of innovation diſplayed itſelf even in the moſt minute matters. Many favours were beſtowed upon the Jews; and in 1786 the emperor wrote with his own hand to the different handicraft and trading corporations in Vienna, requeſting that their youth might be received as apprentices in that city. Severe laws againſt gaming were enacted and put in execution with equal rigour. Heavy reſtrictions were alſo laid on all the ſocieties of free-maſons in Germany, while thoſe in the Netherlands were totally ſuppreſſed.

The great number of innovations in religious matters were highly reſented by the inhabitants of the Netherlands, who have always been remarkable for their attachment to the Romiſh religion in its moſt ſuperſtitious form. Indeed the alterations in the civil conſtitution were ſo great, that even thoſe who were leaſt bigotted in this reſpect began to fear that their liberties were in danger, and an univerſal diſſatisfaction was excited. The emperor behaved at firſt in a very haughty manner, refuſed to yield the ſmalleſt point to the ſolicitations of his ſubjects. Finding, however, that a general revolt was about to take place, and being unable at that time, on account of the Turkiſh war, to ſpare ſuch a force as would be neceſſary to reduce the provinces to obedience, he thought proper, in the autumn of 1787, to promiſe a reſtoration of their ancient conſtitution and privileges. His promiſes, however, were found to be ſo deluſive, and his conduct was ſo arbitrary and capricious, that in the end of the year 1789, the States of all the provinces in the Auſtrian Netherlands came to a reſolution of entirely throwing off the yoke. Articles of a federal union were drawn up, and a new republic was formed under the title of the *Belgic Provinces*. The ſituation of the emperor's affairs at that time did not allow him to take the meaſures neceſſary for preventing this revolt; to which perhaps his ill ſtate of health alſo contributed. About the beginning of February 1790 his diſtemper increaſed to ſuch a degree as to be thought dangerous; and continuing daily to grow worſe, he ſunk under it on the 20th of the ſame month, in the 40th year of his age, and 26th of his reign.

The leaders of the Auſtrian revolution, however, ſoon became ſo diſagreeable to their countrymen, that they were obliged to fly; and the congreſs, which had been eſtabliſhed as the ſupreme legiſlative body, behaved with ſuch tyranny, that they became generally deteſted. Mean time the late emperor was ſucceeded by his brother Peter Leopold Joſeph grand duke of Tuſcany, under whoſe adminiſtration matters have taken a more favourable turn. By his wiſdom, moderation, and humanity, he has already in a great meaſure retrieved the bad conſequences of his predeceſſor's conduct, having made peace with the Ottomans, and regained the allegiance of the Netherlands; and upon the whole ſeems to be actuated not more by a ſenſe of his own rights, than by a regard to the rights and happineſs of his ſubjects.

At preſent, Germany is bounded, on the north, by the Baltic Sea, Denmark, and the German Ocean; on the eaſt, by Pruſſia, Hungary, and Poland; and on the weſt by the Low Countries, Lorraine, and Franche Compte: ſo that it now comprehends the Palatinate, of Cologne, Triers, and Liege, which formerly belonged to the Gauls; and is diſmembered of Frieſland, Groningen, and Overyſſel, which are now incorporated with the Low Countries.

Since the time of Charles the Great, this country

21 Situation, extent, &c. of Germany.

has been divided into High and Low Germany. The firſt comprehends the Palatinate of the Rhine, Franconia, Suabia, Bavaria, Bohemia, Moravia, Auſtria, Carinthia, Carniola, Stiria, the Swiſs, and the Griſons. The provinces of Lower Germany are, the Low Country of the Rhine, Triers, Cologne, Mentz, Weſtphalia, Heſſe, Brunſwic, Miſnia, Luſatia, High Saxony upon the Elbe, Low Saxony upon the Elbe, Mecklenburgh, Lunenburg, Brandenburg, and Pomerania.

22 Conſtitution of the empire.

Monarchy was firſt eſtabliſhed in Germany by Clodovick: after him Charlemagne extended his power and his dominions; and ſo great had the empire become, that during his reign, and that of his ſon, government was adminiſtered in the provinces by perſons veſted with power for that purpoſe under the title of *Dukes*. In the diſtricts of theſe provinces, juſtice was diſtributed by a comes or count, which officer was in German called *Graf*. But from their courts lay an appeal to that of the emperor, before a preſident ſtyled *Comes Palatinus*, that is, "count Palatine, or of the palace," in German denominated *Pſalzgraf*. The frontiers or marches were governed by a marquis, ſtyled by the Germans *Markgraf*, ſimilar to the lord warden in England. Generally the centre of the empire was ruled by an officer, who poſſeſſed a ſimilar power, but a greater extent of dominion, than the Grave, under the title of *Landgrave*. Towns and caſtles, which were occaſionally honoured with the reſidence of the emperor, were governed by a Burggraf. It may be remarked, however, that the ſignification of the above mentioned titles, and the extent of power which they conferred upon the perſons honoured with them, differ according to the ſucceſſive ages and the gradual developement of the German conſtitution.

By reaſon of family broils in the Imperial houſe, and civil wars in the dominions, the dignity of the ſovereign was depreſſed, and a new form in the government raiſed up. The dukes exalted themſelves above the power of the emperor, and ſecured for their ſons a ſucceſſion to their greatneſs; while the intereſt of the ſovereign, in order to ſtrengthen the bond of perſonal attachment, ratified to others and their deſcendants that ſway which had been formerly delegated and dependent on his will. Hence aroſe the modern conſtitution of diſtinct principalities, acknowledging one head in the perſon of the emperor. But ſhortly after the election of Conrade duke of Franconia to the throne, this new-gained authority of the princes became doubtful. However, after moſt violent diſturbances and confuſions, the regulations yielded to by Albert II. and his ſucceſſors, particularly by Frederick III. laid the foundation of the German conſtitution: but the power and form of which were afterwards improved by Maximilian. Before Charles V. mounted the throne on the death of Maximilian, the electors formed a bulwark againſt the Imperial power, by an inſtrument called the *capitulation*; to which articles of government he and all emperors elected ſince have ſworn previous to their inveſtiture with Imperial dignity.

23 Of the electors.

When the German monarchy received an elective form, the right of election was not limited to the great officers of ſtate, for other princes participated of this privilege. But the empire being governed by four dukes, the princes under their authority, in order to court their favour, gave to them the diſpoſal of their votes, and of thoſe of their vaſſals. The three archbiſhops alſo, who were neceſſarily preſent at the coronation, obtained the electoral dignity. However, beſide this origin of the modern electors, the high ſtations about court procured their poſſeſſors an influence over other members, and their general reſidence there gave them a ſolid advantage in their conſtant and early preſence at the diet of election. For in times of turbulence ſeveral emperors were elected, when princes had not an opportunity to attend. And hence ſprung up a ſanction to that right, which the high officers of the houſhold had aſſumed, of electing without any conſultation of the other members of the empire. Pope Gregory X. too, either conceiving that they did poſſeſs, or willing that they ſhould acquire, this right, exhorted them in a bull to terminate the troubles of Germany by electing an emperor. And ſince that period they have been held as the ſole electors. But the poſſeſſion of this high power was ſtrengthened by a league amongſt themſelves called the *electoral union*, which received additional confirmation from the emperor Louis of Bavaria, and was formally and fully ratified by that famous conſtitution of Charles IV. termed the *golden bull*; according to which, the territories and the high offices by which the electoral dignity is conveyed, muſt deſcend according to the right of primogeniture, and are indiviſible.

The golden bull declares the following number and titles of the electors: The archbiſhop of Mentz as great chancellor of the German empire; the elector of Cologne as great chancellor of the empire in Italy; the elector of Triers as great chancellor of the empire in Gaul and Arles; the king of Bohemia as cupbearer; the count Palatine as high ſteward, the duke of Saxony as grand marſhal; the margrave of Brandenburgh as grand chamberlain. The number originally was ſeven, but the emperor Leopold created the duke of Lunenburgh, anceſtor to the preſent Britiſh ſovereign, an elector; to whom the poſt of arch-treaſurer was afterwards given; and thus Hanover forms the eighth electorate. But this number cannot be increaſed by the emperor without a previous election by the electors themſelves; who, thus capable of electing, and of being elected, may ſtyle themſelves *Coimperantes*; and they exerciſe part of the imperial authority, if a vacancy of the throne happen.

24 Election of the emperor.

But when or before this occurs, the election of the emperor is proceeded to after the following manner: The elector of Mentz, before the lapſe of a month after the death of the emperor, ſummons, as great chancellor of the empire, the reſt of the electors to attend on ſome fixed day within the ſpace of three months from the date of the ſummons. The electors generally ſend their ambaſſadors to the place of election, which is held at Frankfort on the Mayne; but ſaving the right of the city of Frankfort, it may be held elſewhere.

When the diet of electors is aſſembled, they proceed to compoſe the capitulation, to which the emperor when elected is to ſwear. The capitulation being adjuſted, the elector of Mentz appoints a day for the election. When this day arrives, the gates of the city are ſhut, and the keys delivered to the elector of Mentz. The electors or their ambaſſadors, proteſtants excepted, repair in great pomp to maſs; and after its celebration they took a ſolemn oath to chooſe, unbiaſſed and uninfluenced, the perſon that appears moſt proper for the imperial dignity. After this they repair to the ſacriſty, where the elector of Mentz firſt aſks, if there be any impediment known againſt their proceeding at preſent to an election? and next he obtains a promiſe that the perſon elected by the majority ſhall be received as emperor. The declarations of the electoral ambaſſadors, in reſpect to theſe two points, are recorded by two notaries of the empire. Then all witneſſes withdraw; and the elector of Mentz collecting the ſuffrages, which are *viva voce*, and giving his own laſt, the witneſſes are recalled, and he declares the perſon whom the electors had choſen. But the election is not complete, nor is the new emperor proclaimed, until the capitulation be ſworn to either by himſelf or by his ambaſſadors if he be abſent. From this time he is ſtyled king of the Romans until the coronation takes place; which ceremony confers the title of emperor. According to the golden bull, it ſhould be celebrated at Aix-la-Chapelle, out of reſpect to Charlemagne, who reſided there; but ſaving the right to Aix la-Chapelle, it may take place elſewhere. The coronation is performed by the archbiſhop of Mentz or elector of Cologne. And when he is ſeated on his throne, the duke of Saxony delivers into his hand the ſword of Charles the Great, with which he makes ſome knights of the holy Roman empire, and is alſo obliged to confer that honour upon ſuch others as are nominated by the reſpective electors. When he proceeds to dinner in the great hall, he is ſeated at a table elevated two ſteps higher than that of the electors, and is ſerved by counts of the empire. The electors, each of whom has alſo his table, are attended by the gentlemen of their reſpective courts. Theſe electors, who aſſiſt perſonally at the ceremony, ſit and eat at their own tables; but thoſe who are repreſented by ambaſſadors have only their tables covered out of form with plates, at which the ambaſſadors do not ſit.

For the benefit of the empire during the reign of an emperor, his preſumptive ſucceſſor may be elected king of the Romans. But this election confers at firſt a mere title; for by an expreſs article in his capitulation, the king of the Romans ſwears not to interfere with the government during the life of the emperor; but on his deceaſe, the coronation confirms him emperor without a ſecond election.

Should there not be a king of the Romans, and the throne become vacant, the government is adminiſtered by vicars of the empire, who are the electors Palatine and of Saxony, as count palatine and arch-marſhal of the empire. Each has his diſtrict and tribunal of the vicariate; and by the golden bull it is eſtabliſhed, that all acts of the vicars are valid; but they are all fully confirmed by the emperor; which confirmation, by an article of his capitulation, he is bound to give.

There are alſo vicars of the emperor. Theſe offices are conſtituted by a delegation of the imperial power from the emperor to any prince of the empire, when he is unable to execute his authority himſelf. But theſe vicars ſtand accountable to the emperor; their acts may be annulled and their offices revoked, all dependent on the will of the emperor, and determinable at his pleaſure.

When the race of Charlemagne ceaſed to govern in Germany, the princes and ſtates aſſociated to continue the empire; and that its majeſty might be viſible, and its laws enforced, they agreed to chooſe an emperor. From this emperor all electors and princes except thoſe before 1582 receive inveſtiture of their dominions; counts and free cities from the Aulic council. But this inveſtiture is no more than a ſign of ſubmiſſion to the majeſty of the empire, which is depoſited in the emperor. For as the conſtituted members of the empire are dependent on that collective union from which they derive protection, they therefore ſhow this dependence on the emperor, becauſe he repreſents the majeſty of the union, or of the empire; but in all other reſpects they are independent and free.

Theſe princes or ſovereigns may even wage war with the prince wearing the imperial crown, as poſſeſſed of other titles and dominions unconnected with his imperial ſtation. Nor can the ſovereignty of any member be affected ſo long as he remains loyal to the empire; which loyalty conſtitutes his duty, and ſecures him its protection. But ſhould he be guilty of any violation againſt the emperor, as head of the empire, ſuch a crime would commit him to the puniſhment of its laws, and he would be put under the ban. For this crime would be againſt that collective body of ſovereigns whoſe union conſtitutes the empire; and therefore any violation of that union is juſtly puniſhed with deprivation of theſe territories which render ſuch ſovereigns members of the empire. Nor can this puniſhment of the ban derogate from the dignity of thoſe princes who derive their ſovereighty from this conſtitution, and whoſe ſubjection is an act of their own conſent. However, no member of the empire can at preſent be put under the ban without being firſt heard, and without the concurrence of the electors, princes, and ſtates, being previouſly obtained.

25
Powers of the emperor.

The emperor is endowed with many privileges, and his power partly appears in the exerciſe of his reſerved rights, or the peculiar prerogatives annexed to the imperial dignity. He grants to princes the inveſtiture of their dominions; but to this he is bound as the laws direct. He confers titles, but promiſes that they ſhall be beſtowed only on ſuch perſons as will maintain their dignity, and can ſupport their rank. Beſide, he can give merely the title: for the power or privilege of prince or count can be obtained only from their reſpective bodies. But in ſome inſtances, even titles are of high importance. For the deſcendants of a prince are incapable of ſucceſſion, if their mother be of inferior rank to their father; but the conferring of a title ennobles her and removes the bar, if the collateral line conſents.

The emperor can alſo make cities, found univerſities, grant the privilege of fairs, &c. He can alſo diſpenſe with the tedious terms of minority, and empower princes to aſſume at an earlier age the government of their own dominions. He decides all rank and precedency, and has a power of *primæ preces*, that is, of granting for once in every chapter of the empire a vacant ſeat. But he is not above the law; for electors have not only choſen but depoſed emperors. However, the influence of the capitulation is to prevent ſuch rigorous proceedings: but ſhould the capitulation be violated, the college of electors might proceed to remonſtrance; and if theſe remonſtrances ſhould be without effect, in conjunction with the diet, they might reſort to more forcible remedies.

26 Diet of the empire.

The diet is that aſſembly of the ſtates in which the legiſlative power of the empire reſides; and is compoſed of the electors, princes, prelates, counts, and free cities of the empire. It has ſat ſince 1663, and is held uſually at Ratiſbon. The emperor, when preſent, preſides in perſon; when abſent, by his commiſſary, whoſe communication of propoſals from the emperor to the aſſembly is called the *commiſſorial decree*. The elector of Mentz, as chancellor of the empire, is director of the diet; and to his chancery are all things addreſſed that are to be ſubmitted to the empire; the reading of which by his ſecretary to the ſecretaries of the other miniſters at the diet is denominated *per dictaturam*, and conſtitutes the form of tranſmitting papers or memorials to the dictature of the empire.—The diet is compoſed of three diſtinct colleges, each of which has its particular director. The firſt college is that of electors; of which the archbiſhop of Mentz is director as firſt elector. The ſecond college is that of princes. It conſiſts of princes, archbiſhops and biſhops; and of prelates, abbots, and counts, who are not conſidered as princes. Each prince ſpiritual and temporal has a vote, but prelates and counts vote by benches. The prelates are divided into two benches, the counts into four: and each bench has only one vote. The archduke of Auſtria and the archbiſhop of Saltzburg are alternately directors of the college of princes. The third college is that of the free cities of the empire; the director of which is the miniſter of the city in which the diet happens to ſit.

In all theſe colleges, the ſentiments of the majority is concluſive, except in reſpect of fundamental laws, which affect the whole empire, or ſuch matters as relate to religion. In theſe they muſt be unanimous.

Where religion is intereſted, the proceedings are alſo different. The colleges are then conſidered as conſiſting of two bodies, the evangelic and the catholic; and if any religious points be propoſed, it muſt meet not only the unanimous concurrence of the propoſing body, but muſt have the majority of the other to eſtabliſh it. This diſtinction aroſe from a conjunction called the *evangelic body*; which was formed by the Proteſtant ſtates and princes to guard the Proteſtant intereſt in Germany, by watching over the laws for the ſecurity of their religion, and, in caſe of violation, by obtaining redreſs from the imperial throne. For in any part of the empire, as in the palatinate, where the count is a Papiſt and the ſubjects are Proteſtants, ſhould oppreſſions ariſe, application would be made to the evangelic body through the director. The elector of Saxony is director of the evangelic body, though he is a Papiſt: but therefore his repreſentations in favour of the Proteſtants have more force; and beſide, ſhould he abuſe an office which inveſts him with conſiderable weight and influence, he could be inſtantly deprived of it.

The firſt two colleges are ſtyled ſuperior, and in effect conſtitute the diet: for all points that come before the diet, are generally firſt deliberated in the college of electors, and paſs from that to the college of princes; in which, if any objections ariſe, a free conference takes place between the directors of each college. And ſhould they, in conſequence of this free conference, concur, they invite the third college to accede to their joint opinion; which invitation is generally complied with: but ſhould this college return a refuſal, the opinion of the other two colleges is in ſome few caſes engroſſed in the chancery, and delivered to the emperor's commiſſary as the opinion of the empire. The opinion of the third college is merely mentioned at the cloſe. However, though the ſuperior colleges do in effect conſtitute the diet: yet the received maxim is, that no two colleges conſtitute a majority, that is, the majority of voices at the diet; nor can the emperor confirm the opinion of two colleges as an opinion of the diet. By the peace of Weſtphalia, a deciſive vote was recognized as a right of the imperial cities, which the two ſuperior colleges ſhould not infringe upon; their vote being, by the fundamental law, of equal weight with that of the electors and princes.

After a meaſure is approved of by the colleges, it is ſubmitted to his imperial majeſty to receive his negative or confirmation. Should he approve the point, it is publiſhed in his name as the reſolution of the empire, which ſtates are exhorted to obey, and tribunals deſired to conſider as ſuch.

The diet not only makes and explains laws, but decides ambiguous caſes. It muſt alſo be conſulted before war is made; appoints the field-marſhal who is to command the army, and aſſigns him his council of war. The diet alſo enters into and makes alliances, but uſually empowers the emperor to negociate them; and foreign ſtates have their ambaſſadors at the diet, but the diet ſends no miniſters to foreign courts.

27 Adminiſtration of juſtice, &c.

In the origin of the empire, juſtice was adminiſtered in the diſtricts of the provinces by counts, and appeals lay from their courts to that of the emperor before the count palatine. But as civil broils ſhook the power of the emperor, they interrupted alſo the courſe of juſtice. The conſequent inconveniences cauſed ſeveral ſolicitations to be preferred from the ſtates to different emperors for the eſtabliſhment of a court of juſtice, which ſhould take cognizance of great as well as ſmall cauſes. And at length ſuch a court was erected by Maximilian I. under the title of the *Imperial Chamber at Worms*, in the year 1495; but was removed to Spires in 1533, and to Wetzlar in 1696, where it is now held. The members of this court are a judge of the chamber and 25 aſſeſſors, partly Proteſtants partly Papiſts. The preſident is appointed by the emperor, the aſſeſſors by the ſtates. The court receives appeals from inferior juriſdictions, and decides dubious titles; and all cauſes before it between prince and prince, or princes and private perſons, are adjudged according to the laws of the reſpective parties, or according to the Imperial law. This tribunal is under the inſpection of viſitors appointed by the ſtates; and, during their viſitation, the ſentences of the court are ſubject to reviſion. Appeals lie afterwards alſo from the judgment of the viſitors to that of the diet.

28 Aulic council.

The emperors, finding themſelves deprived of many of their powers, wiſhed to raiſe their prerogatives by forming a tribunal, of which they would name the judges, and before whom cauſes in the laſt reſort ſhould come. But Maximilian foreſaw, in reſpect to the new tribunal, that though a conſciouſneſs of its importance made the ſtates ſtruggle for its erection, the expences of its eſtabliſhment would make them neglect its ſupport; and the event bore witneſs to his ſagacity. But when, through the omiſſions and negligence of the ſtates, there happened to be a ceſſation in the diſtribution of juſtice by the Imperial chamber, he revived his court of the count Palatinate or Aulic council. And in order to gain the quiet aquieſcence of the ſtates, under the maſk of a partition of power, and of generous moderation, he deſired them to add eight to the number of aſſeſſors, and the ſalaries of all ſhould be diſcharged by him. The ſtates ſwallowed the bait, but ſoon perceived that they had loſt part of their liberty.

The emperor, by keeping the tribunal always open, by filling its ſeats with men of firſt-rate talents, and by having its ſentences duly and ſpeedily executed, drew all cauſes before it. The ſtates remonſtrated, declaring, that the Imperial chamber ought to be not only the ſupreme, but ſole tribunal of that kind. The emperor anſwered, that he had erected the Imperial chamber in conſequence of their ſolicitations; but as they had not ſupplied the tribunal with judges, he provided for that deficiency by a conſtant adminiſtration of juſtice in the eſtabliſhment of another.

The Aulic counſel now ſubſiſts with equal authority, each receiving appeals from inferior juriſdictions; but neither appealing to the other, as the *dernier reſort* from both muſt be had to the diet. However to the Aulic council belong the reſerved right of the emperor; and to the Imperial chamber alſo are annexed peculiar powers. The Imperial chamber ſubſiſts during a vacancy of the throne under the authority of the vicars of the empire; whereas the Aulic council does not exiſt until appointed by the ſucceeding emperor.

The Aulic council conſiſts of a preſident, vice-preſident, and ſeventeen aſſeſſors, of whom ſix are Proteſtants. The vice-chancellor of the empire is alſo intitled to a ſeat; and all decrees iſſuing from the council paſs through his hands to thoſe who are to execute them. This tribunal obtains for the emperor, through the appeals from the courts of other princes, a new authority beſide that which he poſſeſſes from his reſerved rights; but electors and ſome princes, as thoſe of Hanover, Auſtria, Brunſwick, Swediſh Pomerania, Heſſe, are free from this dependence on the emperor, to whoſe Aulic council their ſubjects cannot appeal: nor can it take cognizance of eccleſiaſtical or criminal cauſes, both of which appertain to territorial juſtice; which we ſhall preſently conſider when we have ſurveyed the executive inſtrument of Imperial juſtice.

The diviſion of the empire, into circles is a regulation coeval with the eſtabliſhment of the Imperial chamber by Maximilian, in order to ſtrengthen the arm of juſtice with vigour to enforce its decrees. The original diviſion was into ſix circles, which are called the *ancient circles*; and are Bavaria, Franconia, Suabia, Lower Saxony, the Upper Rhine, and Weſtphalia. But the powerful princes, who at firſt declined bringing their dominions under the form of circles, were led by a political fineſſe of the emperors to adopt the regulation, and increaſe the number to ten, by forming the four new circles of Auſtria, Burgundy, the electorate circle, and Upper Saxony.

Over theſe circles preſide directors, to whom the tribunals of juſtice commit the execution of their decrees. The ſix old circles have two directors each, the four new have one each. The office of director is permanent and hereditary, as it belongs always to the firſt prince in the circle, upon whom it confers high authority: for all the decrees of the Imperial chamber and Aulic counſel are of no avail unleſs the director will execute them.

The directors of the circles are not only inſtruments of war but of peace: for in caſe of an Imperial war, they are to collect the troops of the circle; and if any ſtate or prince of their reſpective circles ſuffer violation from others, they are to yield protection and enforce the peace; or ſhould there be any tumultuous upriſings of the people, the ſuppreſſion of ſuch belongs to them.

The emperor is the executive inſtrument of the whole empire; the directors are ſuch of the conſtitutive parts called circles. The proſperity and ſecurity of which being at ſtake, the directors, as preſidents, muſt hold frequent diets in their reſpective circles, in order to conſult on and adopt ſalutary meaſures for their ſafety and welfare: but as the intereſts of thoſe near to us are generally ſo intimately blended with our own, that the good of either cannot be purſued without the mutual concurrence of both, there ariſe negociations on particular points between the diets of different circles, which are therefore ſtyled *confederate circles*: and theſe negociations being more frequent amongſt the circles of the Upper and Lower Rhine, or Weſtphalia, they are denominated the *correſponding circles*.

29
Powers of the German princes.

Every prince is ſovereign in his own country; and may enter into alliances, and purſue by all political meaſures his own private intereſt, as other ſovereigns do; for if even an Imperial war be declared, he may remain neuter if the ſafety of the empire be not at ſtake.

Each ſtate or ſovereign appoints in general three colleges for its government. The firſt is the *geheimderath*, or privy council; the ſecond is the *regierung*, or regency; the third the *renthcammer*, or chamber of finances. Each of theſe has a preſident; and a member of the firſt college is always preſident of the ſecond.—The geheimderath repreſents the prince, and ſuperintends the other two. The regierung regulates limits of territories, holds conferences with other princes, and is in moſt countries a court of juſtice; however in ſome ſtates there is alſo a court of juſtice called *juſtitz department*. And beſides the right of conferences aſſigned to the regierung by the ſovereign when there are diſputes between princes, there are alſo an *auſtrage*, or arbitration, appointed in order to decide them. Attention muſt be paid to this privilege of princes, who muſt be called on to appoint an auſtrage before reſort be had to the Imperial tribunal, but to which there ſtill lies an appeal from the judgment of the auſtrage. The renthcammer attends to the regulation of domains and eſtates, to the territorial revenues, and management of the taxes.

Every ſovereign or prince is arbitrary in laws of policy, but not of revenue; for no new tax or impoſt can be laid on his country without the conſent of the nobles and ſubjects. For this purpoſe, on the *land tag*, or day on which his ſubjects are to be convened, which is once in the period of four or five years, and at no other time can he aſſemble them, he calls together,

ther the nobles and commiſſaries or deputies of the towns of his dominions. The nobles uſually attend in perſon, but may ſend repreſentatives. To this aſſembly the prince propoſes the taxes, &c. and a majority of voices diſpoſes of the meaſures.

Villages, though conſiderable, ſend no deputies to this aſſembly; becauſe they are either already repreſented by their reſpective lords, or becauſe they rank too low, being in a ſtate of vaſſalage when compared to towns; for their inhabitants muſt mend highways, and can be impreſſed as ſoldiers; from both of which inhabitants of towns are extempt.

On the land tag, the reſpective quotas alſo of each place are fixed, in order to diſcharge the princes contingent in caſe of an Imperial war.

30
Military force and annual revenue.

There is no fixed ſtanding army of the empire; but the various ſtates furniſh their quotas purſuant to the agreement of 1681, when called upon by the diet in caſe of war, viz.

	Foot.	Horſe.
Upper Saxony	2707	1321
Lower Saxony	2707	1321
Weſtphalia	2707	1321
Upper Rhine	2853	491
Lower Rhine	2707	600
Burgundy	2707	1321
Franconia	1902	980
Auſtria	5507	2521
Bavaria	1494	800
Swabia	2707	1321
Total	27,998	11,997

The whole number of forces in the ſervice of the ſeveral German princes have been ſtated at half a million; others calculate that the eccleſiaſtical princes can furniſh 74,500 men, the temporal princes 379,000 and the emperor 90,000, as head of the houſe of Auſtria. Total 543,500.

The revenue accruing to the emperor as ſuch in time of peace, is very trifling, only about 20,000 crowns, being the contribution of a few imperial towns; but in caſe of war, extraordinary aids, called *Roman months*, laid on by the diet, are contributed by the different circles at the following rate for raiſing 1½ million of florins, viz.

	Florins.	Xtr.
Upper Saxony	156,360	15
Lower Saxony	156,360	15
Weſtphalia	156,360	15
Upper Rhine	101,411	30
Lower Rhine	105,654	5
Burgundy	156,360	15
Franconia	113,481	25
Auſtria	306,390	20
Bavaria	91,261	5
Swabia	156,360	15
Total	1,499,999	40

The actual revenue of all Germany has been calculated at nearly L. 18,000,000 ſterling, or 100 million of dollars.

31
Productions and commerce.

From the great extent of the empire, every variety of ſoil is to be met with; but it is upon the whole more fertile than otherwiſe. The middle parts are moſt productive in corn and cattle; the ſouthern abound with excellent wines and fruits. The northern part from their coldneſs, are rather unfavourable to vegetation; however, agriculture throughout improves exceedingly. Their mines, though early explored, ſtill continue great ſources of wealth. They produce, excepting tin, almoſt every mineral. Of quickſilver, one mine alone is computed to yield 5000 pounds weight a-year. They furniſh the fineſt ſort of clay for porcelain, and have excellent and extenſive ſalt-works.

From the central ſituation of Germany, its commerce with the reſt of Europe is very extenſive. Its minerals are decidedly the firſt native articles for trade; after which its medicinal waters, ſalt, hemp, flax, linen, ſilk, wines, fruits, corn, cattle, ſtuffs, cloths, timber, porcelain, wrough iron and ſteel, drugs, oil, and colours, are the principal. The artizans furniſhed by the revocation of the edict of Nantz, enable Germany no longer to ſtand in need of the wrought ſilks of other countries. Great commerical fairs ſtill exiſt in Germany, and it is conſidered upon the whole that the balance of trade is in its favour.

32
Character of the ancient Germans.

With regard to the character of the ancient Germans, they are deſcribed to us by the Greek and Roman writers as reſembling the Gauls; and differing from other nations by the largeneſs of their ſtature, ruddy complexion, blue eyes, and yellow buſhy hair, haughty and threatening looks, ſtrong conſtitutions, and being proof againſt hunger, cold, and all kinds of hardſhip.

Their native diſpoſition diſplayed itſelf chiefly in their martial genius, and in their ſingular fidelity. The former of theſe they did indeed carry to ſuch an exceſs as came little ſhort of downright ferocity; but, as to the latter, they not only valued themſelves highly upon it, but were greatly eſteemed by other nations for it; inſomuch that Auguſtus, and ſeveral of his ſucceſſors, committed the guard of their perſons to them, and almoſt all other nations either courted their friendſhip and alliance, or hired them as auxiliaries: though it muſt be owned, at the ſame time, that their extreme love of liberty, and their hatred of tyranny and oppreſſion, have often hurried them to treachery and murder, eſpecially when they have thought themſelves ill uſed by thoſe who hired them: for in all ſuch caſes they were eaſily ſtirred up, and extremely vindictive. In other caſes, Tacitus tells us, they were noble, magnanimous, and beneficient, without ambition to aggrandize their dominions, or invading thoſe from whom they received no injury; rather chooſing to employ their ſtrength and valour defenſively than offenſively; to preſerve their own, than to ravage their neighbours.

Their friendſhip and intercourſe was rather a compound of honeſt bluntneſs and hoſpitality, than of wit and humour, or gallantry. All ſtrangers were ſure to meet with a kind reception from them to the utmoſt of their ability; even thoſe who were not in a capacity to entertain them, made it a piece of duty to introduce them to thoſe who could; and nothing was looked upon as more ſcandalous and deteſtable, than to refuſe them either the one or the other. They do not ſeem, indeed, to have had a taſte for grand and elegant entertainments: they affected in every thing, in their houſes, furniture, diet, &c. rather plainneſs and ſimplicity, than ſumptuouſneſs and luxury. If they learned of the Romans and Gauls the uſe of money, it was rather becauſe they found it more convenient than their ancient way of bartering one commodity for another; and then they preferred thoſe ancient coins which had been ſtamped during the times of the Roman liberty, eſpecially ſuch as were either milled or cut in the rims, becauſe they could not be ſo eaſily cheated in them as in ſome others, which were frequently nothing but copper or iron plated over with ſilver. This laſt metal they likewiſe preferred before gold, not becauſe it made a greater ſhow, but becauſe it was more convenient for buying and ſelling: And as they became in time more feared by, or more uſeful to, the Romans; ſo they learned how to draw enough of it from them to ſupply their whole country, beſides what flowed to them from other nations.

As they deſpiſed ſuperfluities in other caſes, ſo they did alſo in the connubial way: every man was contented with one wife, except ſome few of their nobles, who allowed themſelves a plurality, more for ſhow than pleaſure; and both were ſo faithful to each other, and chaſte, true, and diſintereſted, in their conjugal affections, that Tacitus prefers their manners in this reſpect to thoſe of the Romans. The men ſought not dowries from their wives, but beſtowed them upon them. Their youth, in thoſe cold climes, did not begin ſo ſoon to feel the warmth of love as they do in hotter ones: it was a common rule with them not to marry young; and thoſe were moſt eſteemed who continued longeſt in celibacy, becauſe they looked upon it as an effectual means to make them grow tall and ſtrong; and to marry, or be concerned with a woman, before they were full 20 years old, was accounted ſhameful wantonneſs. The women ſhared with their huſbands not only the care of their family, and the education of their children, but even the hardſhips of war. They attended them in the field, cooked their victuals for them, dreſſed their wounds, ſtirred them up to fight manfully againſt their enemies, and ſometimes have by their courage and bravery recovered a victory when it was upon the point of being ſnatched from them. In a word, they looked upon ſuch conſtant attendance on them, not as a ſervitude, like the Roman dames, but as a duty and an honour. But what appears to have been ſtill an harder fate upon the ancient German dames was, that their great Odinus excluded all thoſe from his *valhalla*, or paradiſe, who did not, by ſome violent death, follow their deceaſed huſbands thither. Yet notwithſtanding their having been anciently in ſuch high repute for their wiſdom and ſuppoſed ſpirit of prophecy, and their continuing ſuch faithful and tender helpmates to their huſbands, they ſunk in time ſo low in their eſteem, that, according to the old Saxon law, he that hurt or killed a woman was to pay but half the fine that he ſhould have done if he had hurt or killed a man.

33
Their funerals.

There is ſcarcely any one thing in which the Germans, though ſo nearly allied in moſt of their other cuſtoms to the Gauls, were yet more oppoſite to them than in their funerals. Thoſe of the latter were performed with great pomp and profuſion; thoſe of the former were done with the ſame plainneſs and ſimplicity which they obſerved in all other things: the only grandeur they affected in them was, to burn the bodies of their great men with ſome peculiar kinds of wood; but then the funeral pile was neither adorned with the clothes and other fine furniture of the deceaſed, nor perfumed with fragrant herbs and gums: each man's armour, that is, his ſword, ſhield, and ſpear, were flung into it, and ſometimes his riding-horſe. The Danes, indeed, flung into the funeral-pile of a prince, gold, ſilver, and other precious things, which the chief mourners, who walked in a gloomy guiſe round the fire, exhorted the byſtanders to fling liberally into it in honour of the deceaſed. They afterwards depoſited their aſhes in urns, like the Gauls, Romans, and other nations; as it plainly appears, from the vaſt numbers which have been dug all over the country, as well as from the ſundry diſſertations which have been written upon them by ſeveral learned moderns of that nation. One thing we may obſerve, in general, that, whatever ſacrifices they offered for their dead, whatever preſents they made to them at their funerals, and whatever other ſuperſtitious rites they might perform at them, all was done in conſequence of thoſe excellent notions which their ancient religion had taught them, the immortality of the ſoul, and the bliſs or miſery of a future life.

34
Their belief of a future ſtate.

It is impoſſible, indeed, as they did not commit any thing to writing till very lately, and as none of the ancient writers have given us any account of it, to gueſs how ſoon the belief of their great Odin, and his paradiſe, was received among them. It may, for aught we know, have been older than the times of Tacitus, and he have known nothing of it, by reaſon of their ſcrupulous care in concealing their religion from ſtrangers: but as they conveyed their doctrines to poſterity by ſongs and poems, and moſt of the northern poets tell us that they have drawn their intelligence from thoſe very poems which were ſtill preſerved among them; we may rightly enough ſuppoſe that whatever doctrines are contained in them, were formerly profeſſed by the generality of the nation, eſpecially ſince we find their ancient practice ſo exactly comformable to it. Thus, ſince the ſureſt road to this paradiſe was, to excel in martial deeds, and to die intrepidly in the field of battle: and ſince none were excluded from it but baſe cowards, and betrayers of their country; it is natural to think, that the ſignal and exceſſive bravery of the Germans flowed from this ancient belief of theirs: and, if their females were ſo brave and faithful, as not only to ſhare with their huſbands all the dangers and fatigues of war, but at length to follow them by a voluntary death, into the other world; it can hardly be attributed to any thing elſe but a ſtrong perſuaſion of their being admitted to live with them in that place of bliſs. This, belief, therefore, whether received originally from the old Celtes, or afterwards taught them by the ſince deified Odin, ſeems, from their general practice, to have been univerſally received by all the Germans, though they might differ one from another in their notions of that future life.

The notion of a future happineſs obtained by martial exploits, eſpecially by dying ſword in hand, made them bewail the fate of thoſe who live to an old age, as diſhonourable here, and hopeleſs hereafter: upon which account, they had a barbarous way of ſending them into the other world, willing or not willing. And this cuſtom laſted ſeveral ages after their receiving Chriſtianity, eſpecially among the Pruſſians and Venidi; the former of whom, it ſeems, diſpatched by a quick death, not only their children, the ſick, ſervants &c. but even their parents, and ſometimes themſelves: and among the latter we have inſtances of this horrid parricide being practiſed even in the beginning of the 14th century. All that need be added is, that, if thoſe perſons, thus ſuppoſed to have lived long enough, either deſired to be put to death, or at leaſt ſeemed cheerfully to ſubmit to what they knew they could not avoid, their exit was commonly preceded with a faſt, and their funeral with a feaſt; but if they endeavoured to ſhun it, as it ſometimes happened, both ceremonies were performed with the deepeſt mourning. In the former, they rejoiced at their deliverance, and being admitted into bliſs; in the latter, they bewailed their cowardly excluding themſelves from it. Much the ſame thing was done towards thoſe wives who betrayed a backwardneſs to follow their dead huſbands.

35 Remarkable for drinking to exceſs.

We muſt likewiſe obſerve, that, in theſe funerals, as well as in all their other feaſts, they were famed for drinking to exceſs; and one may ſay of them, above all the other deſcendants of the ancient Celtes, that their hoſpitality, banquets, &c. conſiſted much more in the quantity of ſtrong liquors, than in the elegance of eating. Beer and ſtrong mead, which were their natural drink, were looked upon as the chief promoters of health, ſtrength, fertility, and bravery; upon which account, they made no ſcruple to indulge themſelves to the utmoſt in them, not only in their feaſts, and eſpecially before an engagement, but even in their common meals.

36 Character of the modern Germans.

The modern Germans in their perſons are tall and ſtrong built. The ladies have generally fine complexions; and ſome of them, eſpecially in Saxony, have all the delicacy of features and ſhape that are ſo bewitching in a certain iſland of Europe.

Both men and women affect rich dreſſes, which in faſhion are the ſame as in France and England; but the better ſort of men are exceſſively fond of gold and ſilver lace, eſpecially if they are in the army. The ladies at the principal courts differ not much in their dreſs from the French and Engliſh, only they are not ſo exceſſively fond of paint as the former. At ſome courts they appear in rich furs; and all of them are loaded with jewels, if they can obtain them. The female part of the burghers families, in many German towns, dreſs in a very different manner, and ſome of them inconceivably fantaſtic, as may be ſeen in many prints publiſhed in books of Travels; but in this reſpect they are gradually reforming, and many of them make quite a different appearance in their dreſs from what they did 30 or 40 years ago. As to the peaſantry and labourers, they dreſs as in other parts of Europe, according to their employments, conveniency, and opulence. In Weſtphalia, and moſt other parts of Germany, they ſleep between two feather-beds, or rather the upper one of down, with ſheets ſtitched to them, which by uſe becomes a very comfortable practice. The moſt unhappy part of the Germans are the tenants of little needy princes, who ſqueeze them to keep up their own grandeur; but, in general, the circumſtances of the common people are far preferable to thoſe of the French.

The Germans are naturally a frank, honeſt, hoſpitable people, free from artifice and diſguiſe. The higher orders are ridiculouſly proud of titles, anceſtry, and ſhow. The Germans, in general, are thought to want animation, as their perſons promiſe more vigour and activity than they commonly exert even in the field of battle. But when commanded by able generals, eſpecially the Italians, ſuch as Montecuculi and prince Eugene, they have done great things, both againſt the Turks and the French. The Imperial arms have ſeldom made any remarkable figure againſt either of thoſe two nations, or againſt the Swedes or Spaniards, when commanded by German generals. This poſſibly might be owing to the arbitrary obſtinacy of the court of Vienna; for in the two laſt wars the Auſtrians exhibited prodigies of military valour and genius.

Induſtry, application, and perſeverance, are the great characteriſtics of the German nation, eſpecially the mechanical part of it. Their works of art would be incredible were they not viſible, eſpecially in watch and clock making, jewellery, turnery, ſculpture, drawing, painting, and certain kinds of architecture. The Germans have been charged with intemperance in eating and drinking; and perhaps not unjuſtly, owing to the vaſt plenty of their country in wine and proviſions of every kind. But thoſe practices ſeem now to be wearing out. At the greateſt tables, though the gueſts drink pretty freely during dinner, yet the repaſt is commonly finiſhed by coffee after three or four public toaſts have been drank. But no people have more feaſting at marriages, funerals, and birthdays.

The German nobility are generally men of ſo much honour, that a ſharper in other countries, eſpecially in England, meets with more credit if he pretends to be a German, than of any other nation.

The merchants and tradeſmen are very civil and obliging. All the ſons of noblemen inherit their fathers titles, which greatly perplexes the heralds and genealogiſts of that country. This perhaps is one of the reaſons why the German huſbands are not quite ſo complaiſant as they ought otherwiſe to be to their ladies, who are not intitled to any pre-eminence at the table; nor indeed do they ſeem to effect it, being far from either ambition or loquacity, though they are ſaid to be ſomewhat too fond of gaming. From what has been premiſed, it may eaſily be conceived, that many of the German nobility having no other hereditary eſtate than a high-ſounding title, eaſily enter into their armies, and thoſe of other ſovereigns. Their fondneſs for title is attended with many other inconveniences. Their princes think that the cultivation of their lands, though it may treble their revenue, is below their attention; and that, as they are a ſpecies of beings ſuperior to labourers of every kind, they would demean themſelves in being concerned in the improvement of their grounds.

37 Amuſements.

The domeſtic diverſions of the Germans are the ſame as in England; billards, cards, dice, fencing, dancing, and the like. In ſummer, people of faſhion repair to places of public reſort, and drink the waters. As to their field-diverſions, beſides their favourite one of hunting, they have bull and bear beating, and the like. The inhabitants of Vienna live luxuriouſly, a great part of their time being ſpent in feaſting and carouſing; and in winter, when the ſeveral branches of the Danube are frozen over, and the ground covered with ſnow, the ladies take their recreations in ſledges of different ſhapes, ſuch as griffins, tygers, ſwans, ſcollop-ſhells, &c. Here the lady ſits, dreſſed in velvet lined with rich furs, and adorned with laces and jewels, having on her head a velvet cap; and the ſledge is drawn by one horſe, ſtag, or other creature, ſet off with plumes of feathers, ribbons, and bells. As this diverſion is taken chiefly in the night-time, ſervants ride before the ſledge with torches, and a gentleman ſitting on the ſledge behind guides the horſe.

38 Religion and learning.

The Reformation firſt ſpread in Germany to moſt advantage: and ſince the religious peace of 1555, there have been eſtabliſhed the Roman Catholic, prevailing moſtly in the ſouth; the Lutheran in the north; and the Calviniſt, called alſo the *Reformed*, near the Rhine. Civil wars conſiderably deranged this ſettlement: it was, however, eſtabliſhed by the celebrated peace of Weſtphalia, that the religion of the Seven States ſhould remain as in 1624. The Romiſh ſuperior clergy conſiſt of eight archbiſhops, 40 biſhops, and many abbots. The Proteſtant clergy are governed by conſiſtories under the ſovereign of each ſtate. The *Corpus Catholicorum* is under the direction of the archbiſhop, elector of Mentz; and the *Corpus Evangelicorum*, or Proteſtants, under the elector of Saxony; who have the care of the public concerns of their reſpective bodies.

Literature is at preſent in a very advanced ſtate throughout almoſt all Germany~~, but~~ particularly in the Proteſtant ſtates. It is but about half a century ſince the German language has been purified and cultivated; ſince which various works of taſte and elegance, as well as ſuperior productions in the different walks of ſcience, have appeared in it.—There are 38 univerſities in Germany; 19 Proteſtant, 17 Catholic, and 2 which partake of both; beſides a number of literary ſocieties and academic inſtitutions: and education in general is particularly attended to even in the very loweſt ranks.

GERMEN, the ſeed-bud; defined by Linnæus to be the baſe of the piſtillum, which contains the rudiments of the ſeed; and, in progreſs of vegetation, ſwells and becomes the ſeed-veſſel.

In aſſimilating the vegetable and animal kingdoms, Linnæus denominates the ſeed-bud the *ovarium* or *uterus* of plants; and affirms its exiſtence to be chiefly at the time of the diſperſion of the male-duſt by the antheræ; as, after its impregnation, it becomes a ſeed-veſſel. See Botany.

Germen, by Pliny and the ancient botaniſts, is uſed to ſignify a bud containing the rudiments of the leaves. See Gemma.

GERMINATION, among botaniſts, comprehends the preciſe time which the ſeeds take to riſe after they have been committed to the ſoil.—The different ſpecies of ſeeds are longer or ſhorter in riſing according to the degree of heat which is proper to each. Millet, wheat, and ſeveral of the graſſes, riſe in one day; blite, ſpinach, beans, muſtard, kidney-beans, turnips, and rocket, in three days; lettuce and dill, in four; cucumber, gourd, melon, and creſs, in five; raddiſh and beet, in ſix; barley, in ſeven; orach, in eight; purſlane, in nine; cabbage, in ten; hyſſop, in thirty; parſley, in forty or fifty days; peach, almond, walnut, cheſnut, pæony, horned-poppy, hypecoum, and ranunculus falcatus, in one year; roſe-buſh, cornel-tree, hawthorn, medlar, and hazel-nut, in two. The ſeeds of ſome ſpecies of orchis, and of ſome liliaceous plants, never riſe at all. Of ſeeds, ſome require to be ſowed almoſt as ſoon as they are ripe, otherwiſe they will not ſprout or germinate. Of this kind are the ſeeds of coffee and fraxinella. Others, particularly thoſe of the pea-bloom flowers, preſerve their germinating faculty for a ſeries of years.—Mr. Adanſon aſſerts, that the ſenſitive plant retains that virtue for 30 or 40 years.

Air and water are the agents of germination. The humidity of the air alone makes ſeveral ſeeds to riſe that are expoſed to it. Seeds too are obſerved to riſe in water, without the intervention of earth; but water without air is inſufficient.—Mr Homberg's expements on this head are deciſive. He put ſeveral ſeeds under the exhauſted receiver of an air-pump, with a view to eſtabliſh ſomething certain on the cauſes of germination. Some of them did not riſe at all; and the greateſt part of thoſe which did, made very weak and feeble productions. Thus it is for want of air that ſeeds which are buried at a very great depth in the earth, either thrive but indifferently, or do not riſe at all. They frequently preſerve, however, their germinating virtue for many years within the bowels of the earth, and it is not unuſual, upon a piece of ground being newly dug to a conſiderable depth, to obſerve it ſoon after covered with ſeveral plants, which had not been ſeen there in the memory of man. Were this precaution frequently repeated, it would doubtleſs be the means of recovering certain ſpecies of plants which are regarded as loſt; or which perhaps, never coming to the knowledge of botaniſts, might hence appear the reſult of a new creation. Some ſeeds require a greater quantity of air than others. Thus purſlane, which does not riſe till after lettuce in the free air, riſes before it *in vacuo*; and both proſper but little, or periſh altogether, while creſſes vegetate as freely as in the open air.

GERONTES, in antiquity, a kind of judges, or magiſtrates, in ancient Sparta, anſwering to what the Areopagites were at Athens. See Areopagus.

The word is formed of the Greek γερων, which ſignifies "old man." Whence alſo the word *gerontic*, ſomething belonging to an old man; and *Geronicon*, a famous book among the modern Greeks, containing the lives of the ancient monks. The ſenate of gerontes was called *geruſia*, that is, aſſembly or council of old men.

The gerontes were originally inſtituted by Lycurgus: their number, according to ſome, was 28; and according to others, 32. They governed in conjunction with the king, whoſe authority they were intended to balance, and to watch over the intereſts of the people. Polybius defines their office in few words, when he ſays, *per ipſos, & cum ipſis omnia adminiſtrari.* None were to be admitted into this office under 60 years of age, they held it for life. They were ſucceeded by the ephori.

GEROPOGON, in botany: A genus of the polygamia æqualis order, belonging to the ſyngeneſia claſs of plants; and in the natural method ranking under the 49th order, *Compoſitæ*. The receptacle is paleaceous, with the points of the paleæ ſharp or briſtly; the calyx is ſimple; the ſeeds of the diſc have a feathered pappus; thoſe of the radius have a pappus of five awns.

GERRETZ. See Rembrandt.

GERVAISE, (or Gervase), of Tilbury, a famous Engliſh writer of the 13th century; thus named from his being born at Tilbury on the Thames. He was nephew to Henry II. king of England; and was in great credit with Otho IV. emperor of Germany, to whom he dedicated a deſcription of the world, and a Chronicle. He alſo compoſed a Hiſtory of England, that of the Holy Land, and other works.

GERUND, in grammar, a verbal noun of the neuter gender, partaking of the nature of a participle, declinable only in the ſingular number, through all the caſes except the vocative; as nom. *amandum*, gen. *amandi*, dat. *amando*, accuſ. *amandum*, abl. *amando*. The word is formed of the Latin *gerundivus*, and that from the verb *gerere*, "to bear."

The *gerund*, expreſſes not only the *time*, but alſo the *manner*, of an action; as "he fell in running poſt." It differs from the participle, in that it expreſſes the *time*, which the participle does not; and from the tenſe properly ſo called, in that it expreſſes the *manner*, which the tenſe does not. See Grammar.

GERUNDA, (anc. geog.), a town of the Auſetani, in the Hither Spain, on the ſouth or right ſide of the river Sambroca. *Gerundenſes*, the people. Now *Gironne* in Catalonia, on the Ter. E. Long. 2. 35. Lat. 42.

GESNER (Conrad), a celebrated phyſician and naturaliſt, was born at Zurich in 1516. Having finiſhed his ſtudies in France, he travelled into Italy, and taught medicine and philoſophy in his own country with extraordinary reputation. He was acquainted with the languages; and excelled ſo much in natural hiſtory, that he was ſurnamed the *Pliny of Germany*. He died in 1564, leaving many works behind him; the principal of which are, 1. A hiſtory of animals, plants, and foſſils; *Bibliotheca Univerſalis*. A Greek and Latin lexicon. This author is by Boerhaave emphatically ſtyled *Monſtrum Eruditionis*, a prodigy of learning. Thoſe indeed (as Mr Coxe obſerves in his Letters on Switzerland) "who are converſant with the works of this great ſcholar and naturaliſt, cannot repreſs their wonder and admiration at the amplitude of his knowledge in every ſpecies of erudition, and the variety of his diſcoveries in natural hiſtory, which was his peculiar delight. Their wonder and admiration is ſtill further augmented, when they conſider the groſs ignorance of the age which he helped to enlighten, and the ſcanty ſuccours he poſſeſſed to aid him in thus extending the bounds of knowledge; that he compoſed his works, and made thoſe diſcoveries which would have done honour to the moſt enlightened period, under the complicated evils of poverty, ſickneſs, and domeſtic uneaſineſs.

GESNER (Solomon), the celebrated author of the Death of Abel, and many other admired works in the German language, was born at Zurich in the year 1730. In his early years he ſhowed very few ſigns of ſuperior abilities; and his progreſs in the rudiments of education was ſo ſlow, that his maſter gave him up as incapable of any greater attainments than writing and the four firſt rules of arithmetic. Upon this he was placed under a clergyman in the neighbourhood, a relation of his father's, and who ſhowed himſelf better acquainted with the art of diſcovering the natural inclinations of his pupils. This gentleman often carried young Geſner with him into the fields, where he made him obſerve the beauties of nature; and finding that he took great pleaſure in ſuch leſſons, and ſeemed to liſten to them with peculiar attention, he occaſionally repeated ſome of the moſt ſtriking paſſages of the ancient authors, who have written on theſe ſubjects in the moſt agreeable and pleaſing manner. By this ingenious artifice, the mind of young Geſner began to open, and its powers to expand; and it is, perhaps, owing to this circumſtance, that he became ſo fond of the language of Virgil and Theocritus. When he arrived at a proper age to think of purſuing ſome line of buſineſs, Mr Geſner made choice of that of a bookſeller, which was the profeſſion of his father, and in ſome meaſure of his family. Of five houſes at Zurich in the printing and bookſelling buſineſs, two were occupied by Geſners: one belonged to two brothers of that name; and the other, that in which our poet had a ſhare, was known by the firm of *Orel, Geſner, and Company*. It was known alſo by the extent of its correſpondence, and by the choice and elegance of the works which it gave the public.

Though Mr Geſner was a bookſeller, he did not, however, damp his genius by ſubmitting to the drudgery of buſineſs. He indulged himſelf freely in purſuing his favourite object, and his partners never envied him that time which he devoted to meditation and to ſtudy. In 1752, he made a tour through Germany, not ſo much for the purpoſe of extending his commerce, as to ſee and be acquainted with thoſe authors who have done honour to their country. The following circumſtance, which occurred during this tour, deſerves to be mentioned, as it is ſtrikingly characteriſtic of that timidity which often accompanies true genius. When Mr Geſner was at Berlin, he was admitted into a literary ſociety, of which Gleim and Leſſing were members. Each of the authors who compoſed it uſed to read in turn ſome piece of their own compoſition, and Mr. Geſner was very deſirous of ſubmitting to theſe able critics a ſmall work, which was his firſt attempt; but it was far from reſembling thoſe poets, whom Horace, and other ſatyriſts have ridiculed, and who ſtun every one they meet by reciting their verſes before them. As each of the members had done reading, Geſner was obſerved to move his hand with a kind of tremor towards his pocket, and to draw it back again without the manuſcript which he ought to have produced. Having not as yet publiſhed any thing, none of the company could gueſs the cauſe of a motion which his modeſty prevented him from explaining. The work which he had not the courage to ſhow, was his ſmall poem, intitled *Night*, which he publiſhed on his return to Zurich in 1753. It was conſidered as an original, of which no model is to be found among the moderns; but in the opinion of the author, it was only a piece of imaginary painting, or, to uſe an expreſſion of his own, in one of his letters to Mr Huber who has tranſlated his works, "A caricature compoſed in the moments of folly or intoxication." In this little poem he has introduced a ſhort epiſode on the origin of the glow-worm, containing a poetical explanation of this natural phoſphorus, which has all the beauty of Ovid's Metamorphoſes without their prolixity.

lixity. The ſucceſs of this eſſay emboldened the too timid muſe of our young bookſeller, and he publiſhed a paſtoral romance, called *Daphnis*, in three cantos. The applauſe that was deſervedly beſtowed upon this performance induced the author to publiſh, ſome time after, his Idylls and ſome other rural poems in imitation of thoſe of Theocritus. Paſtoral poetry, which at this time was little known in Germany but by tranſlations from foreign poets, began to find many partiſans, and to be preferred to every other kind. Deſirous, therefore, of tracing out a new path for himſelf, our poet thought that he could not do a more acceptable ſervice to his countrymen, than to paint the felicity of innocence and rural life, and the tender emotions of love and gratitude. The only author worthy of notice who had preceded Mr Geſner in this career, was Mr Roſt of Leipſick, whoſe paſtoral poems appeared for the firſt time in 1744. This writer poliſhed the language of the German ſhepherds; he had addreſs enough to unite ſpirit and ſimplicity in a kind of writing which appears inſipid without the former, and which becomes unnatural and diſguſting if it is too abundant. He ſometimes throws a delicate veil over thoſe images which are deficient in decency, but it is to be regretted that it is often too ſlight. Such was the antagoniſt againſt whom Geſner had to contend. Our poet, however, purſued a different courſe. Inſtead of placing, like Roſt, his ſcenes in modern times, he goes back with Theocritus to the golden age, that happy age which we are fond of reviewing when our paſſions are calm, and when freed from thoſe anxious cares which hurry us beyond ourſelves, we contemplate amidſt tranquillity the beauties and fertility of the country. The characters of Geſner's Idylls, therefore, are taken from thoſe ſocieties which exiſt no longer but in the remembrance or rather the imagination. His ſhepherds are fathers, children, and huſbands, who bluſh not at theſe titles ſo dear to nature, and to whom generoſity, beneficence, and reſpect for the Deity, are ſometimes no leſs familiar than love. Theſe Idylls were the principal and favourite object of his purſuit, and that part of his work which acquired him the greateſt reputation, eſpecially among his countrymen. His death of Abel, which is well known, was publiſhed for the firſt time in 1758. It is written, like the reſt of his pieces, in poetical proſe; and was ſo much ſought after, that it went through no leſs than three editions in the ſpace of a year, without ſpeaking of the ſpurious ones which appeared in Holland, at Berlin, and in France. The French edition was followed by ſeveral others. One came out in Italian; another in the Dutch language; a fourth in the Daniſh; and, laſtly, two in Engliſh, one of them in proſe and the other in verſe. Among the pieces which Mr Geſner publiſhed after the Death of Abel, was his Firſt Navigator, a poem in three cantos, which many people in Germany conſider as his maſter-piece. He made an attempt alſo in the paſtoral drama, but not with the ſame ſucceſs as in other kinds of rural poetry. He produced likewiſe, in the ſame ſtyle, Evander and Alcimne, in three acts; and Eraſtus, a ſmall piece of one act, which was repreſented with ſome applauſe in ſeveral ſocieties, both at Leipſick and Vienna.

But though poetry was Geſner's darling purſuit, and though he enriched the literature of his country with works which will render his name immortal, he did not confine himſelf to one manner of imitating nature; he in turns took up the pencil and the pen, and his active genius equally directed them both. In his infancy he had received a few leſſons in drawing, and he had afterwards purſued his ſtudy, but without any intention of becoming an artiſt. At the age of thirty, he felt that violent deſire, which may be conſidered as the voice of genius; and this was in ſome meaſure excited by the ſight of a beautiful collection formed by Mr Heidegger, whoſe daughter he had married. To pleaſe his father-in-law, he ſtudied this treaſure, compoſed principally of the beſt pieces of the Flemiſh ſchool; and to this new taſte he had almoſt ſacrificed every other. Mr Geſner at firſt ventured only to delineate ſome decorations for the frontiſpieces of curious books printed in his office; but by little and little, he had the courage to make other attempts. In 1765, he publiſhed 10 landſcapes etched and engraved by himſelf, and dedicated them to his friend Mr Watelet. Mr Geſner owed him this mark of reſpect for the care which he took to ornament with beautiful vignettes Mr Huber's tranſlation of his Idylls. Twelve other pieces appeared in 1769; and after theſe attempts, Mr Geſner executed ornaments for many works which came from his preſſes, among which were his own works, a German tranſlation of Swift, and ſeveral others.

Were we to judge from Mr Geſner's enthuſiaſm for his favourite purſuits, and from the time and attention which he beſtowed upon them, we ſhould be apt to conclude, that he found little leiſure for diſcharging his duty as a citizen. The contrary, however, was the caſe, for he paſſed almoſt the half of his life in the firſt employments of the ſtate. In 1765 he was called to the grand council, in 1767 to the leſſer. In 1768 he was appointed bailiff of Eilibach, that of the four guards in 1776, and in 1781 ſuperintendant of waters, which office in 1787 was continued to him for ſix years. In all theſe ſtations Mr Geſner diſcharged his duty with the moſt ſcrupulous fidelity; and died of a paralytical diſorder, lamented by his countrymen and by thoſe who had the pleaſure of his acquaintance, on the 2d of March 1788, at the age of 56.

As a paſtoral poet, Geſner undoubtedly is intitled to a very diſtinguiſhed rank; and we may juſtly ſay, that if he has been equalled by any, he has been excelled by none. It is commonly believed, that paſtoral poetry is very limited and confined; but thoſe who read the works of Geſner will be convinced, that it is ſuſceptible of much variety when treated of by the hand of a maſter. His paſtoral romance of Daphnis is not inferior in natural ſimplicity to the celebrated work of Longus; but it ſurpaſſes it far in variety of images and incident. Eraſtus and Evander are inſtructive and intereſting poems, on account of the contraſt between the world and nature which reigns throughout them; and his Firſt Navigator unites the mildeſt philoſophy to all the ſplendor and imagery of fairy-land. If we analyſe his dramatic poems, we ſhall find in them intereſting fictions, characters well delineated, and ſituations replete with novelty. His language is that of the Graces, and the chaſteſt ears might liſten to the love which he has created. If he has ſometimes the humour of Sterne and Fontaine, it is without their licentiouſneſs. The ſevereſt taſte can find in his writings no lacuna to ſupply, no phraſe deſerving reprehenſion, nor could a more ingenious choice of expreſſions be ſubſtituted in the room of thoſe which he has adopted.—Geſner's character, as a man, appears to be no leſs amiable. In whatever point of view we conſider him, whether as a huſband, a father, a friend, a magiſtrate, or a citizen, his virtues are equally conſpicuous. He was naturally of a melancholy turn, but he was no enemy to rational and well-timed mirth; while the mildneſs and affability of his temper rendered his company always engaging, and endeared him to thoſe who had the pleaſure of his acquaintance. Poſſeſſed of that nobleneſs of ſentiment, united with great modeſty, which is the uſual attendant of true genius, he was ſimple in his external appearance, as well as in his converſation. His language was lively and animated; but his reſerve before ſtrangers reſembled timidity, and it was only in the preſence of thoſe with whom he was acquainted, that his real character appeared in its full luſtre.

Mr Geſner's reputation and virtues were known even to the remoteſt parts of Europe. The Empreſs of Ruſſia Catharine II. preſented him with a gold medal as a mark of her eſteem. Strangers of all nations gave him no leſs flattering teſtimonies of their admiration; and travellers thought they had ſeen only the half of Switzerland, if they had not been in the company of Geſner, or procured ſome of his landſcapes or drawings. In this laſt way he had acquired ſo much reputation, that he was ranked among the beſt artiſts of Germany; and Mr Fueſlin, his countryman, who was himſelf a painter, in the preface to the third volume of the new edition which he publiſhed of his 'Hiſtorical eſſay on the painters, engravers, architects and ſculptors, who have done honour to Switzerland,' gives a diſtinguiſhed place to Mr Geſner, though then living.

GESNERIA, in botany: A genus of the angioſpermia order, belonging to the didynamia claſs of plants; and in the natural method ranking under the 40th order, *Perſonatæ*. The calyx is quinquefid, and placed on the germen; the corolla incurvated and then recurvated; the capſule inferior and bilocular.

GESSORIACUM (anc. geog.), a port and ſtation for ſhips of the Morini in Belgica. In Cæſar's time, according to Dio, there was no town; but Florus ſpeaks of it as one: and the Geſoriacenſes Muri are mentioned by Eumenius in his Panegyric. The author of Tabula Theodoſiana, commonly called *Peutinger's map*, ſays expreſly, that Geſſoriacum was in his time called *Bononia*. Now *Boulogne* in Picardy. E. Long. 1. 30. N. Lat. 50. 40.

GESTATION, among phyſicians. See PREGNANCY.

GESTRICIA, a province of Sweden, bounded by Helſingia on the north, by the Bothnic gulph on the eaſt, by Upland on the ſouth, and by Dalecarlia on the weſt.

GESTURE, a motion of the body, intended to ſignify ſome idea or paſſion of the mind. It conſiſts principally in the actions of the hands and face; and may be defined, a ſuitable conformity of the motions of the countenance, and of ſeveral parts of the body, in ſpeaking to the ſubject matter of the diſcourſe. See DECLAMATION, and ORATORY, nº 130, 131.

GETA (SEPTIMIUS), a ſon of the emperor Severus, brother to Caracalla. In the eighth year of his age, he was moved with compaſſion at the fate of ſome of the partizans of Niger and Albinus who were to be executed, and his father ſtruck with his humanity retracted the ſentence. After Severus's death, he reigned at Rome conjointly with his brother; but Caracalla, who envied his virtues and was jealous of his popularity, ordered him to be poiſoned; and when this could not not be effected, he murdered him in the arms of his mother Julia, who in the attempt of defending the fatal blows from his body received a wound in her arm, from the hand of her ſon, A. D. 212. Geta had not yet reached the 23d year of his age, and the Romans had reaſon to lament the death of ſo virtuous a prince, while they groaned under the cruelties and oppreſſion of Caracalla.

GETHIN (Lady Grace), an Engliſh lady of uncommon parts, was the daughter of Sir George Norton of Abbots-Leigh in Somerſetſhire, and born in the year 1676. She had all the advantages of a liberal education; and became the wife of Sir Richard Gethin, of Gethin-Grott in Ireland. She was miſtreſs of great accompliſhments, natural and acquired, but did not live long enough to diſplay them to the world; for ſhe died in the 21ſt year of her age. She was buried in Weſtminſter-abbey, where a beautiful monument with an inſcription is erected over her; and for perpetuating her memory, proviſion was made for a ſermon to be preached in Weſtminſter-abbey, yearly, on Aſh-Wedneſday for ever. She wrote, and left behind her, in looſe papers, a work, which, ſoon after her death, was methodized, and publiſhed under the title of '*Reliquiæ Gethinianæ*; or, Some remains of the moſt ingenious and excellent lady, Grace lady Gethin, lately deceaſed. Being a collection of choice diſcourſes, pleaſant apophthegms, and witty ſentences. Written by her, for the moſt part, by way of eſſay, and at ſpare hours.' Lond. 1700, 4to; with her picture before it.

GETHSEMANE (anc. geog.), a village in the mount of Olives, whither Jeſus Chriſt ſometimes retreated in the night time. It was in a garden belonging to this village that he ſuffered the agony in which he ſweated drops of blood; and here he was arreſted by Judas and the reſt who were conducted by this traitor. The place is by Maundrel deſcribed as an even plot of ground, not above 57 yards ſquare, lying between the foot of Mount Olivet and the brook Cedron.

GETHYLLIS, in botany: A genus of the monogynia order, belonging to the dodecandria claſs of plants; and in the natural method ranking under the ninth order, *Spathaceæ*. The corolla is ſix-cleft, and the ſtamina are in ſix different directions; the capſule is trilocular.

GEUM, AVENS, or *Herb-Bennet*: A genus of the polygamia order, belonging to the icoſandria claſs of plants; and in the natural method ranking under the 35th order, *Senticoſæ*. The calyx is cleft into ten parts; there are five petals, and each of the ſeeds has a jointed awn. There are five ſpecies; of which the moſt remarkable are, 1. The urbanum, with thick fibrous roots of an aromatic taſte, rough, ſerrated leaves, and upright, round, hairy ſtalks terminated by large yellow flowers, ſucceeded by globular fruit. 2. The rivale, with a very thick, fleſhy, and fibrous root, hairy leaves, and upright ſtalks, 10 or 12 inches high, terminated by purple flowers nodding on one ſide. Of this there are varieties with red and with yellow flowers.—Both theſe are natives of Britain, and are eaſily propagated either by the root or ſeed. The roots of the firſt, gathered in the ſpring before the ſtem comes up, and infuſed in ale, give it a pleaſant flavour, and prevent its growing ſour. Infuſed in wine, they have a ſtomachic virtue. The taſte is mildly auſtere and aromatic, eſpecially when the plant grows in warm dry ſituations; but in moiſt ſhady places, it hath little virtue. Cows, goats, ſheep, and ſwine, eat the plant; horſes are not fond of it.—The powdered root of the ſecond ſpecies will cure tertian agues, and is daily uſed for that purpoſe by the Canadians. Sheep and goats eat the plant; cows, horſes, and ſwine, are not fond of it.

GHENT, a city of the Auſtrian Netherlands, capital of the province of Flanders. It is ſeated on four navigable rivers, the Scheld, the Lys, the Lieve, and the Moere, which run through it, and divide it into canals. Theſe form 26 little iſles, over which there are 300 bridges: among which there is one remarkable for a ſtatue of braſs of a young man who was obliged to cut off his father's head; but as he was going to ſtrike, the blade flew into the air, and the hilt remained in his hand, upon which they were both pardoned. There is a picture of the whole tranſaction in the town-houſe. Ghent is ſurrounded with walls and other fortifications, and is tolerably ſtrong for a place of its circumference. But all the ground within the walls is not built upon. The ſtreets are large and well paved, the market-places ſpacious, and the houſes built with brick. But the Friday's market-place is the largeſt, and is remarkable for the ſtatue of Charles V. which ſtands upon a pedeſtal in the imperial habit, That of Cortere is remarkable for a fine walk under ſeveral rows of trees. In 1737 a fine opera-houſe was built here, and a guard-houſe for the garriſon. Near the town is a very high tower, with a handſome clock and chimes. The great bell weighs 11,000 pounds.

This town is famous for the pacification ſigned here, in 1526, for ſettling the tranquillity of the Seventeen Provinces, which was afterwards confirmed by the king of Spain. It was taken by Louis XIV. in 1678, who afterwards reſtored it. The French took poſſeſſion of it again after the death of Charles II. of Spain. In 1706, it was taken by the duke of Marlborough; and by the French in 1708; but it was retaken the ſame year. Laſt of all, the French took it by ſurpriſe after the battle of Fontenoy; but at the peace of Aix-la-Chapelle it was rendered back. This is the birth-place of John of Gaunt. It is very well ſeated for trade, on account of its rivers and canals. It carries on a great commerce in corn; and has linen, woollen, and ſilk manufactures. The number of inhabitants is about 70,000. E. Long. 4. 0. N. Lat. 51. 44.

GHOST, an apparition, or ſpirit of a perſon deceaſed.

The ancients ſuppoſed every man to be poſſeſſed of three different ghoſts, which after the diſſolution of the human body were differently diſpoſed of. Theſe three ghoſts are diſtinguiſhed by the names of *Manes*, *Spiritus*, *Umbra*. The *manes*, they fancied, went down into the infernal regions; the *ſpiritus* aſcended to the ſkies; and the *umbra* hovered about the tomb, as being unwilling to quit its old connections. Thus Dido (Virg. Æn. iv. 384.) threatens Æneas after death that ſhe will haunt him with her umbra, whilſt her manes rejoice in his torments below. This idea of a threefold ſoul is very clearly expreſſed in theſe lines, which have been attributed to Ovid.

Bis duo ſunt homini: MANES, CARO, SPIRITUS, UMBRA:
Quatuor iſta loci bis duo ſuſcipiunt
Terra tegit CARNEM, *tumulum circumvolat* UMBRA,
Orcus habet MANES, SPIRITUS *aſtra petit.*

The moſt ſtriking outlines of the popular ſuperſtitions reſpecting ghoſts among us, are thus humorouſly collected by Captain Groſe in his Provincial Gloſſary: "A ghoſt is ſuppoſed to be the ſpirit of a perſon deceaſed, who is either commiſſioned to return for ſome eſpecial errand, ſuch as the diſcovery of a murder, to procure reſtitution of lands or money unjuſtly withheld from an orphan or widow—or, having committed ſome injuſtice whilſt living cannot reſt till that is redreſſed. Sometimes the occaſion of ſpirits reviſiting this world, is to inform their heir in what ſecret place, or private drawer in an old trunk, they had hidden the title-deeds of the eſtate; or where, in troubleſome times, they buried their money or plate. Some ghoſts of murdered perſons, whoſe bodies have been ſecretly buried, cannot be at eaſe till their bones have been taken up, and depoſited in conſecrated ground with all the rites of Chriſtian burial.

"Sometimes ghoſts appear in conſequence of an agreement made, whilſt living, with ſome particular friend, that he who firſt died ſhould appear to the ſurvivor.

"Glanvil tells us of the ghoſt of a perſon who had lived but a diſorderly kind of life, for which it was condemned to wander up and down the earth, in the company of evil ſpirits, till the day of judgment.

"In moſt of the relations of ghoſts, they are ſuppoſed to be mere aerial beings, without ſubſtance, and that they can paſs through walls, and other ſolid bodies at pleaſure. A particular inſtance of this is given, in relation the 27th, in Glanvil's collection, where one David Hunter, neat-herd to the biſhop of Down and Connor, was for a long time haunted by the apparition of an old woman, whom he was by a ſecret impulſe obliged to follow whenever ſhe appeared, which he ſays he did for a conſiderable time, even if in bed with his wife: and becauſe his wife could not hold him in his bed, ſhe would go too, and walk after him till day, though ſhe ſaw nothing; but his little dog was ſo well acquainted with the apparition, that he would follow it as well as his maſter. If a tree ſtood in her walk, he obſerved her always to go through it. Notwithſtanding this ſeeming immateriality, this very ghoſt was not without ſome ſubſtance; for, having performed her errand, ſhe deſired Hunter to lift her from the ground; in the doing of which, he ſays, ſhe felt juſt like a bag of feathers. We ſometimes alſo read of ghoſts ſtriking violent blows; and that, if not made way for, they overturn all impediments, like a furious whirlwind. Glanvil mentions an inſtance of this, in relation 17th, of a Dutch lieutenant who had the faculty of ſeeing ghoſts; and who, being prevented making

king way for one which he mentioned to ſome friends as coming towards them, was, with his companions, violently thrown down, and ſorely bruiſed. We further learn, by relation 16th, that the hand of a ghoſt is ‘ as cold as a clod.’

“ The uſual time at which ghoſts make their appearance is midnight, and ſeldom before it is dark; though ſome audacious ſpirits have been ſaid to appear even by day-light: but of this there are few inſtances, and thoſe moſtly ghoſts who have been laid perhaps in the Red Sea (of which more hereafter), and whoſe times of confinement were expired: theſe, like felons confined to the lighters, are ſaid to return more troubleſome and daring than before. No ghoſts can appear on Chriſtmas eve; this Shakeſpeare has put into the mouth of one of his characters in Hamlet.

“ Ghoſts commonly appear in the ſame dreſs they uſually wore whilſt living, though they are ſometimes clothed all in white; but that is chiefly the churchyard ghoſts, who have no particular buſineſs, but ſeem to appear *pro bono publico*, or to ſcare drunken ruſtics from tumbling over their graves.

“ I cannot learn that ghoſts carry tapers in their hands, as they are ſometimes depicted, though the room in which they appear, if without fire or candle, is frequently ſaid to be as light as day. Dragging chains is not the faſhion of Engliſh ghoſts; chains and black veſtments being chiefly the accoutrements of foreign ſpectres ſeen in arbitrary governments: dead or alive, Engliſh ſpirits are free. One inſtance, however, of an Engliſh ghoſt dreſſed in black, is found in the celebrated ballad of William and Margaret, in the following lines:

> And clay-cold was her lily hand,
> That held her *ſable ſhrowd*.

This, however, may be conſidered as a poetical licence, uſed in all likelihood for the ſake of the oppoſition of *lily* to *ſable*.

“ If, during the time of an apparition, there is a lighted candle in the room, it will burn extremely blue: this is ſo univerſally acknowledged, that many eminent philoſophers have buſied themſelves in accounting for it, without once doubting the truth of the fact. Dogs too have the faculty of ſeeing ſpirits, as is inſtanced in David Hunter's relation above quoted; but in that caſe they uſually ſhow ſigns of terror, by whining and creeping to their maſter for protection: and it is generally ſuppoſed that they often ſee things of this nature when their owner cannot; there being ſome perſons, particularly thoſe born on a Chriſtmas eve, who cannot ſee ſpirits.

“ The coming of a ſpirit is announced ſome time before its appearance, by a variety of loud and dreadful noiſes; ſometimes rattling in the old hall like a coach and ſix, and rumbling up and down the ſtaircaſe like the trundling of bowls or cannon balls. At length the door flies open, and the ſpectre ſtalks ſlowly up to the bed's foot, and opening the curtains, looks ſtedfaſtly at the perſon in bed by whom it is ſeen; a ghoſt being very rarely viſible to more than one perſon, although there are ſeveral in company. It is here neceſſary to obſerve, that it has been univerſally found by experience, as well as affirmed by diverſe apparitions themſelves, that a ghoſt has not the power to ſpeak till it has been firſt ſpoken to; ſo that, notwithſtanding the urgency of the buſineſs on which it may come, every thing muſt ſtand ſtill till the perſon viſited can find ſufficient courage to ſpeak to it: an event that ſometimes does not take place for many years. It has not been found that female ghoſts are more loquacious than thoſe of the male ſex, both being equally reſtrained by this law.

“ The mode of addreſſing a ghoſt is by commanding it, in the name of the Three Perſons of the Trinity, to tell you who it is, and what is its buſineſs: this it may be neceſſary to repeat three times; after which it will, in a low and hollow voice, declare its ſatisfaction at being ſpoken to, and deſire the party addreſſing it not to be afraid, for it will do him no harm. This being premiſed, it commonly enters into its narrative; which being completed, and its requeſt or commands given, with injunctions that they be immediately executed, it vaniſhes away, frequently in a flaſh of light; in which caſe, ſome ghoſts have been ſo conſiderate as to deſire the party to whom they appeared to ſhut their eyes: ſometimes its departure is attended with delightful muſic. During the narration of its buſineſs, a ghoſt muſt by no means be interrupted by queſtions of any kind; ſo doing is extremely dangerous: if any doubts ariſe, they muſt be ſtated after the ſpirit has done its tale. Queſtions reſpecting its ſtate, or the ſtate of any of their former acquaintance, are offenſive, and not often anſwered; ſpirits perhaps being reſtrained from divulging the ſecrets of their priſon houſe. Occaſionally ſpirits will even condeſcend to talk on common occurrences, as is inſtanced by Glanvil in the apparition of Major George Sydenham to Captain William Dyke, relation 10th, wherein the major reproved the captain for ſuffering a ſword he had given him to grow ruſty: ſaying, “ Captain, captain, this ſword did not uſe to be kept after this manner when it was mine.” This attention to the ſtate of arms, was a remnant of the major's profeſſional duty when living.

“ It is ſomewhat remarkable that ghoſts do not go about their buſineſs like the perſons of this world. In caſes of murder, a ghoſt, inſtead of going to the next juſtice of the peace, and laying its information, or to the neareſt relation of the perſon murdered, appears to ſome poor labourer who knows none of the parties, draws the curtain of ſome decrepit nurſe or almſwoman, or hovers about the place where his body is depoſited. The ſame circuitous mode is purſued with reſpect to redreſſing injured orphans or widows; when it ſeems as if the ſhorteſt and moſt certain way would be, to go to the perſon guilty of the injuſtice, and haunt him continually till he be terrified into a reſtitution. Nor are the pointing out loſt writings generally managed in a more ſummary way; the ghoſt commonly applying to a third perſon, ignorant of the whole affair, and a ſtranger to all concerned. But it is preſumptuous to ſcrutinize too far into theſe matters: ghoſts have undoubtedly forms and cuſtoms peculiar to themſelves.

“ If, after the firſt appearance, the perſons employed neglect, or are prevented from, performing the meſſage or buſineſs committed to their management, the ghoſt appears continually to them, at firſt with a diſcontented, next an angry, and at length with a furious countenance, threatening to tear them in pieces if the matter is not forthwith executed; ſometimes terrifying them, as in Glanvil's relation 26th, by appearing in many formidable ſhapes, and ſometimes even ſtriking them a violent blow. Of blows given by ghoſts there are many inſtances, and ſome wherein they have been followed with an incurable lameneſs.

"It ſhould have been obſerved, that ghoſts, in delivering their commiſſions, in order to enſure belief, communicate to the perſons employed ſome ſecret, known only to the parties concerned and themſelves, the relation of which always produces the effect intended. The buſineſs being completed, ghoſts appear with a cheerful countenance, ſaying they ſhall now be at reſt, and will never more diſturb any one; and, thanking their agents, by way of reward communicate to them ſomething relative to themſelves, which they will never reveal.

"Sometimes ghoſts appear, and diſturb a houſe, without deigning to give any reaſon for ſo doing: with theſe, the ſhorteſt and only way is to exorciſe, and eject them; or, as the vulgar term is, lay them. For this purpoſe there muſt be two or three clergymen, and the ceremony muſt be performed in Latin; a language that ſtrikes the moſt audacious ghoſt with terror. A ghoſt may be laid for any term leſs than an 100 years, and in any place or body, full or empty; as, a ſolid oak—the pommel of a ſword—a barrel of beer, if a yeoman or ſimple gentleman—or a pipe of wine, if an eſquire or a juſtice. But of all places the moſt common, and what a ghoſt leaſt likes, is the Red Sea; it being related, in many inſtances, that ghoſts have moſt earneſtly beſought the exorciſts not to confine them in that place. It is nevertheleſs conſidered as an indiſputable fact, that there are an infinite number laid there, perhaps from its being a ſafer priſon than any other nearer at hand; though neither hiſtory nor tradition gives us any inſtance of ghoſts eſcaping or returning from this kind of tranſportation before their time.

"Another ſpecies of human apparition may be here noticed, though it does not come under the ſtrict deſcription of a ghoſt. Theſe are the exact figures and reſemblance of perſons then living, often ſeen not only by their friends at a diſtance, but many times by themſelves; of which there are ſeveral inſtances in Aubery's Miſcellanies: one of Sir Richard Napier, a phyſician of London, who being on the road from Bedfordſhire to viſit a friend in Berkſhire, ſaw at an inn his own apparition lying on his bed as a dead corpſe; he nevertheleſs went forward, and died in a ſhort time: another of Lady Diana Rich, daughter of the Earl of Holland, who met her own apparition walking in a garden at Kenſington, and died a month after of the ſmall-pox. Theſe apparitions are called *fetches;* in Cumberland, *ſwarths;* and in Scotland, *wraiths:* they moſt commonly appear to diſtant friends and relations, at the very inſtant preceding the death of the perſon whoſe figure they put on. Sometimes, as in the inſtances abovementioned, there is a great interval between the appearance and death." For a philoſophical inquiry into the ſubject of apparitions in general, ſee the article SPECTRE.

GIAGH, in chronology, a cycle of 12 years; in uſe among the Turks and Cathayans.

Each year of the giagh bears a name of ſome animal: the firſt that of a mouſe; the ſecond that of a bullock; the third of a lynx or leopard; the fourth of a hare; the fifth of a crocodile; the ſixth of a ſerpent; the ſeventh of a horſe; the eight of a ſheep; the ninth of a monkey; the tenth of a hen; the eleventh of a dog; and the twelfth of a hog.

They alſo divide the day into 12 parts, which they call *giaghs,* and diſtinguiſh them by the names of ſome animals. Each giagh contains two of our hours, and is divided into eight kehs, as many as there are quarters in our hours.

GIALLOLINO, in natural hiſtory, a fine yellow pigment much uſed under the name of NAPLES YELLOW.

GIANT, a perſon of extraordinary bulk and ſtature.

The Romances of all ages have furniſhed us with ſo many extravagant accounts of giants of incredible bulk and ſtrength, that the exiſtence of ſuch people is now generally diſbelieved. It is commonly thought, that the ſtature of man hath been the ſame in all ages; and ſome have even pretended to *demonſtrate* the impoſſibility of the exiſtence of giants mathematically. Of theſe Mr M'Laurin hath been the moſt explicit. "In general (ſays he) it will eaſily appear, that the efforts tending to deſtroy the coheſion of beams ariſing from their own gravity only, increaſe in the quadruplicate ratio of their lengths; but that the oppoſite efforts tending to preſerve their coheſion, increaſe only in the triplicate proportion of the ſame lengths. From which it follows, that the greater beams muſt be in greater danger of breaking than the leſſer ſimilar ones; and that though a leſſer beam may be firm and ſecure, yet a great ſimilar one may be made ſo long, that it will neceſſarily break by its own weight. Hence Galileo juſtly concludes, that what appears very firm, and ſucceeds very well in models, may be very weak and infirm, or even fall to pieces by its own weight, when it comes to be executed in large dimenſions according to the model. From the ſame principle he argues, that there are neceſſary limits in the operations of nature and art, which they cannot ſurpaſs in magnitude. Were trees of a very enormous ſize, their branches would fall by their own weight. Large animals have not ſtrength in proportion to their ſize; and if there were any land-animals much larger than thoſe we know, they could hardly move, and would be perpetually ſubject to the moſt dangerous accidents. As to the animals of the ſea, indeed, the caſe is different; for the gravity of the water in a great meaſure ſuſtains thoſe animals; and in fact theſe are known ſometimes to be vaſtly larger than the greateſt land-animals. Nor does it avail againſt this doctrine to tell us, that bones have ſometimes been found which were ſuppoſed to have belonged to giants of immenſe ſize; ſuch as the ſkeletons mentioned by Strabo and Pliny, the former of which was 60 cubits high, and the latter 46: for naturaliſts have concluded on juſt grounds, that in ſome caſes theſe bones had belonged to elephants; and that the larger ones were bones of whales, which had been brought to the places where they were found by the revolutions of nature that have happened in paſt times. Though it muſt be owned, that there appears no reaſon why there may not have been men who have exceeded by ſome feet in height the talleſt we have ſeen."

It will eaſily be ſeen, that arguments of this kind can never be conluſive; becauſe, along with an encreaſe of ſtature in any animal, we muſt always ſuppoſe a proportional increaſe in the coheſion of the parts of its body. Large works ſometimes fail when conſtructed on the plan of models, becauſe the coheſion of the materials whereof the model is made, and of the large work, are the ſame; but a difference in this reſpect will produce a very remarkable difference in the ultimate reſult. Thus, ſuppoſe a model is made of firwood, the model may be firm and ſtrong enough; but a large work made alſo of fir, when executed according to the plan of the model, may be ſo weak that it will fall to pieces with its own weight. If, however, we make uſe of iron for the large work inſtead of fir, the whole will be ſufficiently ſtrong, even though made exactly according to the plan of the model. The like may be ſaid with regard to large and ſmall animals. If we could find an animal whoſe bones exceeded in hardneſs and ſtrength the bones of other animals as much as iron exceeds fir, ſuch an animal might be of a monſtrous ſize, and yet be exceedingly ſtrong. In like manner, if we ſuppoſe the fleſh and bones of a giant to be greatly ſuperior in hardneſs and ſtrength to the bones of other men, the great ſize of his body will be no objection at all to his ſtrength. The whole of the matter therefore concerning the exiſtence of giants muſt reſt on the credibility of the accounts we have from thoſe who pretend to have ſeen them, and not on any arguments drawn *à priori*.

In the ſcripture we are told of *giants*, who were produced from the marriages of the *ſons of God* with the *daughters of men*.* This paſſage indeed has been differently interpreted, ſo as to render it doubtful whether the word tranſlated *giants* does there imply any extraordinary ſtature. In other parts of ſcripture, however, giants, with their dimenſions, are mentioned in ſuch a manner that we cannot poſſibly doubt; as in the caſe of Og king of Baſham, and Goliath. In a memoir read before the Academy of Sciences at Rouen, M. Le Cat gives the following account of giants that are ſaid to have exiſted in different ages.

“ Profane hiſtorians have given ſeven feet of height to Hercules their firſt hero; and in our days we have ſeen men eight feet high. The giant who was ſhown in Rouen in 1735, meaſured eight feet ſome inches. The emperor Maximin was of that ſize; Shenkius and Platerus, phyſicians of the laſt century, ſaw ſeveral of that ſtature; and Goropius ſaw a girl who was ten feet high.—The body of Oreſtes, according to the Greeks, was eleven feet and a half; the giant Galbara, brought from Arabia to Rome under Claudius Cæſar, was near ten feet; and the bones of Secondilla and Puſio, keepers of the gardens of Salluſt, were but ſix inches ſhorter. Funnam, a Scotſman, who lived in the time of Eugene II. king of Scotland, meaſured eleven feet and a half: and Jacob le Maire, in his voyage to the ſtraits of Magellan, reports, that on the 17th of December 1615, they found at Port Deſire ſeveral graves covered with ſtones; and having the curioſity to remove the ſtones, they diſcovered human ſkeletons of ten and eleven feet long. The chevalier Scory, in his voyage to the peak of Teneriffe, ſays, that they found in one of the ſepulchre caverns of that mountain the head of a Guanche which had 80 teeth, and that the body was not leſs than 15 feet long. The giant Ferragus, ſlain by Orlando nephew of Charlemagne, was 18 feet high. Rioland, a celebrated anatomiſt, who wrote in 1614, ſays, that ſome years before there was to be ſeen in the ſuburbs of St Germain the tomb of the giant Iſoret, who was 20 feet high. In Rouen, in 1509, in digging in the ditches near the Dominicans, they found a ſtone tomb containing a ſkeleton whoſe ſkull held a buſhel of corn, and whoſe ſhin-bone reached up to the girdle of the talleſt man there, being about four feet long, and conſequently the body muſt have been 17 or 18 feet high. Upon the tomb was a plate of copper, whereon was engraved, “ In this tomb lies the noble and puiſſant lord, the chevalier Ricon de Vallemont, and his bones.” Platerus, a famous phyſician, declares, that he ſaw at Lucerne the true human bones of a ſubject which muſt have been at leaſt 19 feet high. Valence in Dauphiné boaſts of poſſeſſing the bones of the giant Bucart, tyrant of the Vivarais, who was ſlain by an arrow by the count De Cabillon his vaſſal. The Dominicans had a part of the ſhin-bone, with the articulation of the knee, and his figure painted in freſco, with an inſcription, ſhowing that this giant was 22 feet and a half high, and that his bones were found in 1705, near the banks of the Morderi, a little river at the foot of the mountain of Cruſſol, upon which (tradition ſays) the giant dwelt.

“ January 11. 1613, ſome maſons digging near the ruins of a caſtle in Dauphiné in a field which (by tradition) had long been called *the giant's field*, at the depth of 18 feet diſcovered a brick-tomb 30 feet long, 12 feet wide, and 8 feet high; on which was a grey ſtone, with the words *Theutobochus Rex* cut thereon. When the tomb was opened, they found a human ſkeleton entire, 25 feet and a half long, 10 feet wide acroſs the ſhoulders, and five feet deep from the breaſtbone to the back. His teeth were about the ſize each of an ox's foot, and his ſhin-bone meaſured four feet.—Near Mazarino, in Sicily, in 1516, was found a giant 30 feet high; his head was the ſize of an hogſhead, and each of his teeth weighed five ounces. Near Palermo, in the valley of Mazara, in Sicily, a ſkeleton of a giant 30 feet long was found, in the year 1548; and another of 33 feet high, in 1550; and many curious perſons have preſerved ſeveral of theſe gigantic bones.

“ The Athenians found near their city two famous ſkeletons, one of 34 and the other of 36 feet high.

“ At Totu, in Bohemia, in 758, was found a ſkeleton, the head of which could ſcarce be encompaſſed by the arms of two men together, and whoſe legs, which they ſtill keep in the caſtle of that city, were 26 feet long. The ſkull of the giant found in Macedonia, September 1691, held 210 pounds of corn.

“ The celebrated Sir Hans Sloane, who treated this matter very learnedly, does not doubt theſe facts; but thinks the bones were thoſe of elephants, whales, or other enormous animals.

“ Elephants bones may be ſhown for thoſe of giants; but they can never impoſe on connoiſſeurs. Whales, which, by their immenſe bulk, are more proper to be ſubſtituted for the largeſt giants, have neither arms nor legs; and the head of that animal hath not the leaſt reſemblance to that of a man. If it be true, therefore, that a great number of the gigantic bones which we have mentioned have been ſeen by anatomiſts, and by them have been reputed real human bones, the exiſtence of giants is proved."

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* See *Antediluvians*, p.66. col. 1.

With regard to the credibility of all or any of theſe accounts, it is difficult to determine any thing. If, in any caſtle of Bohemia, the bones of a man's leg 26 feet in length are preſerved, we have indeed a deciſive proof of the exiſtence of a giant, in compariſon of whom moſt others would be but pigmies. Nor indeed could theſe bones be ſuppoſed to belong to an elephant; for an elephant itſelf would be but a dwarf in compariſon of ſuch an enormous monſter. But if theſe bones were really kept in any part of Bohemia, it ſeems ſtrange that they have not been frequently viſited, and particular deſcriptions of them given by the learned who have travelled into that country. It is certain, however, that there have been nations of men conſiderably exceeding the common ſtature. Thus, all the Roman hiſtorians inform us, that the Gauls and Germans exceeded the Italians in ſize; and it appears that the Italians in thoſe days were of much the ſame ſtature with the people of the preſent age. Among theſe northern nations, it is alſo probable, that there would be as great differences in ſtature as there are among the preſent race of men. If that can be allowed, we may eaſily believe that ſome of theſe barbarians might be called *giants*, without any great impropriety. Of this ſuperiority of ſize, indeed, the hiſtorian Florus gives a notable inſtance in Teutobochus, abovementioned, king of the Teutones: who being defeated and taken priſoner by Marius, was carried in triumph before him at Rome, when his head reached above the trophies that were carried in the ſame proceſſion.

But whether theſe accounts are credited or not, we are very certain, that the ſtature of the human body is by no means abſolutely fixed. We are ourſelves a kind of giants in compariſon of the Laplander; nor are theſe the moſt diminutive people to be found upon the earth. The abbe la Chappe, in his journey into Siberia, in order to obſerve the laſt tranſit of Venus, paſſed through a village inhabited by people called *Wotiacks*, neither men nor women of whom were above four feet high. The accounts of the Patagonians alſo, which cannot be entirely diſcredited, render it very probable, that ſomewhere in South America there is a race of people very conſiderably exceeding the common ſize of mankind, and conſequently that we cannot altogether diſcredit the relations of giants handed down to us by ancient authors; though what degree of credit we ought to give them, is not eaſy to be determined. See PATAGONIA.

Rebel GIANTS, in ancient mythology, were the ſons of Cœlus and Terra. According to Heſiod, they ſprang from the blood of the wound which Cœlus received from his ſon Saturn, and Hyginus calls them ſons of Tartarus and Terra. They are repreſented as men of uncommon ſtature, with ſtrength proportioned to their gigantic ſize. Some of them, as Cottus, Briareus, and Gyges, had each 50 heads and 100 arms, and ſerpents inſtead of legs. They were of a terrible aſpect, their hair hung looſe about their ſhoulders, and their beard was ſuffered to grow unmoleſted. Pallene and its neighbourhood was the place of their reſidence. The defeat of the Titans, to whom they were nearly related, incenſed them againſt Jupiter, and they all conſpired to dethrone him. Accordingly they reared Mount Oſſa upon Pelion, and Olympus upon Oſſa; and from thence attacked the gods with huge rocks. Some of which fell into the ſea and became iſlands, and others fell on the earth and formed mountains. Jupiter ſummoned a council of the gods; when being informed that it was neceſſary to obtain the aſſiſtance of ſome mortal, he by the advice of Pallas called up his ſon Hercules; and with the aid of this hero he exterminated the giants Enceladus, Polybotes, Alcyon, Porphyrion, the two ſons of Alœus, Ephialtus, Othus, Eurytus; Clytius, Tythyus, Pallas, Hypolitus, Agrius, Thoon, and Typhon, the laſt of whom it was more difficult to vanquiſh than all the others. Jupiter having thus gained a complete victory, caſt the rebels down to Tartarus, where they were to receive the full puniſhment of their enormous crimes: according to the accounts of ſome of the poets, he buried them alive under Mount Etna, and different iſlands.

GIANTS-Cauſeway, a vaſt collection of Baſaltic pillars in the county of Antrim in Ireland. See the article BASALTES.

The principal or grand cauſeway (for there are ſeveral leſs conſiderable and ſcattered fragments of ſimilar workmanſhip) conſiſts of a moſt irregular arrangement of many hundred thouſands of columns of a black kind of rock, hard as marble: almoſt all of them are of a pentagonal figure, but ſo cloſely and compactly ſituated on their ſides, though perfectly diſtinct from top to bottom, that ſcarce any thing can be introduced between them. The columns are of an unequal height and breadth; ſome of the higheſt, viſible above the ſurface of the ſtrand, and at the foot of the impending angular precipice, may be about 20 feet; they do not exceed this height, at leaſt none of the principal arrangement. How deep they are fixed in the ſtrand, was never yet diſcovered. This grand arrangement extends nearly 200 yards, viſible at low water; how far beyond is uncertain: from its declining appearance, however, at low water, it is probable it does not extend under water to a diſtance any thing equal to what is ſeen above. The breadth of the principal cauſeway, which runs out in one continued range of columns, is, in general, from 20 to 30 feet; at one place or two it may be nearly 40 for a few yards. In this account are excluded the broken and ſcattered pieces of the ſame kind of conſtruction, that are detached from the ſides of the grand cauſeway, as they do not appear to have ever been contiguous to the principal arrangement, though they have frequently been taken into the width; which has been the cauſe of ſuch wild and diſſimilar repreſentations of this cauſeway, which different accounts have exhibited. The higheſt part of this cauſeway is the narroweſt, at the very foot of the impending cliff from whence the whole projects, where, for four or five yards, it is not above ten or fifteen feet wide. The columns of this narrow part incline from a perpendicular a little to the weſtward, and form a ſlope on their tops, by the very unequal height of the columns on the two ſides, by which an aſcent is made at the foot of the cliff, from the head of one column to the next above, *gradatim*, to the top of the great cauſeway, which, at the diſtance of half a dozen yards from the cliff, obtains a perpendicular poſition, and lowering in its general height, widens to about 20 or between 20 and 30 feet, and for 100 yards nearly is always above water. The tops of the columns for this length being nearly of an equal height, they form a grand and ſingular parade, that may be eaſily walked on, rather inclining to the water's edge. But from high-water mark, as it is perpetually waſhed by the beating ſurges on every return of the tide, the platform lowers conſiderably, and becomes more and more uneven, ſo as not to be walked on but with the greateſt care. At the diſtance of 150 yards from the cliff, it turns a little to the eaſt for 20 or 30 yards, and then ſinks into the ſea. The figure of theſe columns is almoſt unexceptionably pentagonal, or compoſed of five ſides; there are are but very few of any other figure introduced: ſome few there are of three, four, and ſix ſides, but the generality of them are five-ſided, and the ſpectator muſt look very nicely to find any of a different conſtruction: yet what is very extraordinary, and particularly curious, there are not two columns in ten thouſand to be found, that either have their ſides equal among themſelves, or whoſe figures are alike. Nor is the compoſition of theſe columns or pillars leſs deſerving the attention of the curious ſpectator. They are not of one ſolid ſtone in an upright poſition; but compoſed of ſeveral ſhort lengths, curiouſly joined, not with flat ſurfaces, but articulated into each other like ball and ſocket, or like the joints in the vertebræ of ſome of the larger kind of fiſh, the one end at the joint having a cavity, into which the convex end of the oppoſite is exactly fitted. This is not viſible, but by disjoining the two ſtones. The depth of the concavity or convexity is generally about three or four inches. And what is ſtill farther remarkable of the joint, the convexity, and the correſpondent concavity, is not conformed to the external angular figure of the column, but exactly round, and as large as the ſize or diameter of the column will admit; and conſequently as the angles of theſe columns are in general extremely unequal, the circular edges of the joint are ſeldom coincident with more than two or three ſides of the pentagonal, and from the edge of the circular part of the joint to the exterior ſides and angles they are quite plain. It is ſtill farther very remarkable, likewiſe, that the articulations of theſe joints are frequently inverted, in ſome the concavity is upwards, in others the reverſe. This occaſions that variety and mixture of concavities and convexities on the tops of the columns, which is obſervable throughout the platform of this cauſeway, yet without any diſcoverable deſign or regularity with reſpect to the number of either. The length alſo of theſe particular ſtones, from joint to joint, is various: in general, they are from 18 to 24 inches long; and, for the moſt part, longer toward the bottom of the columns than nearer the top, and the articulation of the joints ſomething deeper. The ſize or diameter likewiſe of the columns is as different as their length and figure; in general, they are from 15 to 20 inches in diameter. There are really no traces of uniformity or deſign diſcovered throughout the whole combination, except in the form of the joint, which is invariably by an articulation of the convex into the concave of the piece next above or below it; nor are there any traces of a finiſhing in any part, either in height, length, or breadth, of this curious cauſeway. If there is here and there a ſmooth top to any of the columns above water, there are others juſt by, of equal height, that are more or leſs convex or concave, which ſhow them to have been joined to pieces that have been waſhed or by other means taken off. And undoubtedly thoſe parts that are always above water have, from time to time, been made as even as might be; and the remaining ſurfaces of the joints muſt naturally have been worn ſmoother by the conſtant friction of weather and walking, than where the ſea, at every tide, is beating upon it and continually removing ſome of the upper ſtones and expoſing freſh joints. And farther, as theſe columns preſerve their diameters from top to bottom, in all the exterior ones, which have two or three ſides expoſed to view, the ſame may with reaſon be inferred of the interior columns whoſe tops only are viſible. Yet what is very extraordinary, and equally curious, in this phenomenon, is, that notwithſtanding the univerſal diſſimilitude of the columns, both as to their figure and diameter, and though perfectly diſtinct from top to bottom, yet is the whole arrangement ſo cloſely combined at all points, that hardly a knife can be introduced between them either on the ſides or angles. And it is really a moſt curious piece of entertainment to examine the cloſe contexture and nice inſertion of ſuch an infinite variety of angular figures as are exhibited on the ſurface of this grand parade. From the infinite diſſimilarity of the figure of theſe columns, this will appear a moſt ſurpriſing circumſtance to the curious ſpectator; and would incline him to believe it a work of human art, were it not, on the other hand, inconceivable that the wit or invention of man ſhould conſtruct and combine ſuch an infinite number of columns, which ſhould have a general apparent likeneſs, and yet be ſo univerſally diſſimilar in their figure, as that, from the minuteſt examination, not two in ten or twenty thouſand ſhould be found, whoſe angles and ſides are equal among themſelves, or of the one column to thoſe of the other. That it is the work of nature, there can be no doubt to an attentive ſpectator, who carefully ſurveys the general form and ſituation, with the infinitely various figuration of the ſeveral parts of this cauſeway. There are no traces of regularity or deſign in the outlines of this curious phenomenon; which, including the broken and detached pieces of the ſame kind of workmanſhip, are extremely ſcattered and confuſed, and, whatever they might originally, do not at preſent appear to have any connection with the grand or principal cauſeway, as to any ſuppoſable deſign or uſe in its firſt conſtruction, and as little deſign can be inferred from the figure or ſituation of the ſeveral conſtituent parts. The whole exhibition is, indeed, extremely confuſed, diſuniform, and deſtitute of every appearance of uſe or deſign in its original conſtruction. But what, beyond diſpute, determines its original to have been from nature, is, that the very cliffs, at a great diſtance from the cauſeway, eſpecially in the bay to the eaſtward, exhibit at many places the ſame kind of columns, figured and jointed in all reſpects like thoſe of the grand cauſeway: ſome of them are ſeen near to the top of the cliff, which in general, in theſe bays to the eaſt and weſt of the cauſeway, is near 300 feet in height; others again are ſeen about midway, and at different elevations from the ſtrand. A very conſiderable expoſure of them is ſeen in the very bottom of the bay to the eaſtward, near a hundred roods from the cauſeway, where the earth has evidently fallen away from them upon the ſtrand, and exhibits a moſt curious arrangement of many of theſe pentagonal columns, in a perpendicular poſition, ſupporting in appearance, a cliff of different ſtrata of earth, clay, rock, &c. to the height of 150 feet or more, above. Some of theſe columns are between 30 and 40 feet high, from the top of the ſloping bank below them; and, being longeſt in the middle of the arrangement, ſhortening on either hand in view, they had obtained the appellation of *organs*, from a rude likeneſs in this particular to the exterior or frontal tubes of that inſtrument; and as there are few broken pieces on the ſtrand near it, it is probable that the outſide range of columns that now appears is really the original exterior line, to the ſeaward, of this collection. But how far they extend internally into the bowels of the incumbent cliff, is unknown. The very ſubſtance, indeed, of that part of the cliff which projects to a point, between the two bays on the eaſt and weſt of the cauſeway, ſeems compoſed of this kind of materials; for beſides the many pieces that are ſeen on the ſides of the cliff, that circulate to the bottom of the bays, particularly the eaſtern ſide, there is, at the very point of the cliff, and juſt above the narrow and higheſt part of the cauſeway, a long collection of them ſeen, whoſe heads or tops juſt appearing without the ſloping bank, plainly ſhow them to be in an oblique poſition, and about half-way between the perpendicular and horizontal. The heads of theſe, likewiſe, are of mixed ſurfaces, convex and concave, and the columns evidently appear to have been removed from their original upright, to their preſent inclining or oblique poſition, by the ſinking or falling of the cliff.

GIBBET, or GIBET, a machine in manner of a gallows, whereon notorious criminals, after execution, are hung in irons or chains, as ſpectacles *in terrorem*. See GALLOWS.—The word in French, *gibet*, properly denotes what we call gallows: it is ſuppoſed to come originally from the Arabic *gibel*, "mount or elevation of ground;" by reaſon *gibets* are uſually placed on hills or eminences.

GIBBOUS, a term in medicine, denoting any protuberance or convexity of the body, as a perſon hunched or hump backed.

Infants are much more ſubject to gibboſity than adults, and it oftener proceeds from external than internal cauſes. A fall, blow, or the like, frequently thus diſtorts the tender bones of infants. When it proceeds from an internal cauſe, it is generally from a relaxation of the ligaments that ſuſtain the ſpine, or a caries of its vertebræ; though the ſpine may be inflected foreward, and the vertebræ thrown out by a too ſtrong and repeated action of the abdominal muſcles. This, if not timely redreſſed, grows up and fixes as the bones harden, till in adults it is totally irretrievable: but when the diſorder is recent, and the perſon young, there are hopes of a cure. The common method is by a machine of paſteboard, wood, or ſteel, which is made to preſs principally on the gibbous part; and this by long wearing may ſet all right. The ſurgeons, however, have a different inſtrument, which they call a *croſs*, much more efficacious, though not quite ſo convenient in the wearing. By the uſe of this, the parts are always prevented from growing any worſe, and are often cured. During the application of theſe aſſiſtances, the parts ſhould be at times rubbed with hungary-water, ſpirit of lavender, or the like, and defended with a ſtrengthening plaſter.

GIBBOUS, in aſtronomy, a term uſed in reference to the enlightened parts of the moon, whilſt ſhe is moving from the firſt quarter to the full, and from the full to the laſt quarter: for all that time the dark part appears horned or falcated; and the light one hunched out, convex, or gibbous.

GIBEAH, a city in the tribe of Benjamin, lying north of Jeruſalem about 20 or 30 furlongs, and built upon a hill as its name imports.—This city gave birth to Saul, the firſt king of Iſrael, for which reaſon it is frequently called Gibeah of Saul, or Gibeah the native country of Saul.

GIBELINS, or GIBELLINS, a famous faction in Italy, oppoſite to another called the GUELPHS.

Thoſe two factions ravaged and laid waſte Italy for a long ſeries of years; ſo that the hiſtory of that country, for the ſpace of two centuries, is no more than a detail of their mutual violences and ſlaughters. The Gibelins ſtood for the emperor againſt the pope: but concerning their origin and the reaſon of their names we have but a very obſcure account. According to the generality of authors, they roſe about the year 1240, upon the emperor Frederick II.'s being excommunicated by the pope Gregory IX. Other writers maintain, that the two factions aroſe ten years before, though ſtill under the ſame pope and emperor. But the moſt probable opinion is that of Maimbourg, who ſays, that the two factions of Guelphs and Gibelins aroſe from a quarrel between two ancient and illuſtrious houſes on the confines of Germany, that of the Henries of Gibeling, and that of the Guelphs of Adorf.

GIBEON, a city ſeated on an eminence about 40 furlongs from Jeruſalem northward, and not far from the city of Gibeah. See GEBA.

This was the capital city of the Gibeonites, who took the advantage of Joſhua's oath, and of that which the elders of Iſrael likewiſe ſwore to them, upon an artificial repreſentation which they made of their belonging to a very remote country, and their deſire of making an alliance with the Hebrews. Joſhua (ix. 3. 4, *& ſeq.*) and the elders inconſiderately entered into a league with theſe people; but ſoon diſcovered their miſtake. Upon this, ſending for the Gibeonites, they reproached them with their fraud; and without revoking the promiſe which they had made to them, of giving them their lives, they condemned them to carry wood and water to the tabernacle of the Lord, as ſlaves and captives taken in war; in which ſtate of ſervitude they remained till the ruin and entire diſperſion of the Jewiſh nation.

The Gibeonites were deſcended from the Hivites, the old inhabitants of that country; and poſſeſſed four cities, whereof Gibeon was the capital. The cities were Cephira, Beeroth, Kirjathjearim, and Gibeon, Joſh. ix. 17. Theſe cities were afterwards given to the tribe of Benjamin, except Kirjathjearim, which fell to the tribe of Judah. The Gibeonites continued ever after ſubject to thoſe burdens which Joſhua had impoſed on them, and were very faithful to the Iſraelites.

Giblets, Gibraltar

GIBLETS, the offals or entrails of a gooſe; including the heart and liver, with the feet, gizzard, &c. The word is ſuppoſed to be formed of *goblets;* from the French *gobeau,* "mouthful."—Giblets make a conſiderable article in cookery: they boil giblets, ſtew giblets, make ragous of giblets, giblet-pies, &c.

GIBRALTAR, a famous promontory, or rather peninſula, of Spain, lying in N. Lat. 35. 50. W. Long. 5. 35. To the ancients it was known by the name of *Calpe,* and was alſo called one of the *Pillars of Hercules;* by the Arabians it is called *Gabel Tarek,* that is "the mount of Tarek, from *Tarek,* the name of the Saracen general who conquered Spain in the beginning of the eighth century. The whole is an immenſe rock, riſing perpendicularly about 440 yards, meaſuring from north to ſouth about two Engliſh miles, but not above one in breadth from eaſt to weſt.—The town lies along the bay on the weſt ſide of the mountain on a declivity; by which, generally ſpeaking, the rains paſs through it, and keep it clean. The old town was conſiderably larger than the new, which at preſent conſiſts of between 400 and 500 houſes. Many of the ſtreets are narrow and irregular; the buildings are of different materials; ſome of natural ſtone out of the quarries, ſome of a factitious or artificial ſtone, and a few of brick. The people are ſupplied with freſh proviſions chiefly from the coaſt of Barbary, with fruit, roots, and vegetables of all ſorts from thence, or from their own gardens. Beſides what is properly called the town, there are ſeveral ſpacious and commodious public edifices erected; ſuch as barracks for the ſoldiers, with apartments for their officers, magazines of different kinds, ſtorehouſes for proviſions, &c. The inhabitants, excluſive of the Britiſh ſubjects dependent on the garriſon, or who reſide there from other motives, conſiſt of ſome Spaniards, a few Portugueſe, a conſiderable number of Genoeſe, and about as many Jews; making in the whole, according to Dr Campbell, between two and three thouſand, without reckoning the garriſon; though ſome make them much fewer. The town may be ſaid to have two ports; the firſt lying to the north, and is proper only for ſmall veſſels; the other is very commodious only for large veſſels, and has a fine ſtone quay. The bay is very beautiful and capacious, being in breadth about five miles, and in length eight or nine, with ſeveral ſmall rivers running into it. It is very advantageous to the place. There is no ground to be found in the middle of it at 100 fathoms depth, ſo that a ſquadron may lie there in great ſafety; the breezes from it are very refreſhing; and it contributes likewiſe to the ſubſiſtence of the inhabitants, by ſupplying them with plenty of fiſh.

The ſtrait of Gibraltar, through which the ocean paſſes into the Meditterranean, thereby dividing Europe from Africa, runs from weſt to eaſt about 13 leagues. In this ſtrait there are three remarkable promontories or capes on the Spaniſh ſide, and as many oppoſite to them on the Barbary ſide. The firſt of theſe, on the ſide of Spain, is cape Trefalgar, oppoſite to which is cape Spartel; and in the neighbourhood of this ſtood the fortreſs of Tangier, once in the poſſeſſion of the Britiſh. The next on the Spaniſh ſide is Tariſa; and over againſt it lies Malabata, near the town of Alcaſſar, where the ſtraits are about five leagues broad. Laſtly, Gibraltar, facing the mountain of Abyla, near the fortreſs and town of Ceuta, which make the eaſtern entry of the ſtraits.

Gibraltar.

1 Fortreſs firſt erected by the Saracens.

This important fortreſs ſeems to have been firſt particularly noticed as a place of conſequence in th eyear 712. At that time the general of the caliph Al Walid landed with an army of 12,000 men on the iſthmus between Mons Calpe and the continent; and that he might ſecure an intercourſe with Africa, ordered a caſtle to be built on the face of that hill. Part of the building ſtill remains; and, from an inſcription diſcovered above the principal gate, appears to have been finiſhed in 725. It continued in the poſſeſſion of the Saracens till the beginning of the 14th century, when it was recovered by Ferdinand king of Caſtile. In 1333, however, it was obliged to ſurrender to the ſon of the emperor of Fez, who came to the aſſiſtance of the Mooriſh king of Granada. An attempt was made upon it in 1349 by Alonzo king of Caſtile; but when the fortreſs had been reduced to the laſt extremity, a peſtilential fever broke out in the Spaniſh camp, which carried off the king himſelf, with great part of his army; after which the enterpriſe was abandoned.

2 Various revolutions.

The fortreſs continued in the poſſeſſion of the Saracen deſcendants of the prince of Fez until the year 1410, when it was taken poſſeſſion of by Joſeph III. king of Granada. A deſign of attacking it was formed by Henry de Guſman in 1435; but the enterpriſe having miſcarried through his imprudence, he was defeated and ſlain. However, it was at length taken after a gallant defence by his ſon John de Guſman in 1462; ſince which time it has remained in the hands of the Chriſtians. In 1540, it was ſurpriſed and pillaged by Piali Hamet, one of Barbaroſſa's corſairs; but the pirates having fallen in with ſome Sicilian galleys, were by them defeated, and all either killed or taken.

3 Its fortifications improved and ſtrengthened.

In the reign of Charles V. the fortifications of Gibraltar were moderniſed, and ſuch additions made as to render them almoſt impregnable. It was taken by the Engliſh, however, in the reign of queen Anne, and ſince that time has remained in their poſſeſſion; and probably will always do ſo, unleſs ceded by treaty, as it appears altogether impoſſible to reduce it by any force of artillery let it be ever ſo great. In the year 1704, in conſequence of the reſolution adopted by the court of Britain to aſſiſt the archduke Charles in his pretenſions to the Spaniſh crown, Sir George Rooke was ſent with a powerful fleet into the Meditteranean. His orders being limited, nothing of conſequence was done for ſome time, until at laſt an attempt on Gibraltar was reſolved upon; not ſo much on account of the importance of the conqueſt, as to prevent any reflections againſt the admiral for inactivity. On the 21ſt of July that year, 1800 troops were landed upon the iſthmus under the command of the prince of Heſſe Darmſtadt; and on the refuſal of the governor to ſurrender, preparations were made for attacking the place. Early in the morning of the 23d, a cannonade, was begun from the fleet, and kept up ſo briſkly, that in five or ſix hours the Spaniards were driven from many of their guns, eſpecially at the new mole-head. The admiral perceiving, that by gaining this part of the fortification, the reduction of the reſt would be facilitated, ordered out ſome armed boats to take poſſeſſion of it. On their approach the Spaniards ſprung a mine,

4 Taken by Sir George Rooke in 1704.

mine, which demoliſhed part of the works, killed two lieutenants and 40 private ſoldiers, wounding about 60 more. Notwithſtanding this diſaſter, the aſſailants kept poſſeſſion of the work, and took a ſmall baſtion, now the eight-gun battery, half way between the mole and the town. On this the governor thought proper to capitulate, and the prince of Heſſe took poſſeſſion of the gates on the 24th. The garriſon, conſiſting at moſt of 150 men marched out with the honours of war; and the Spaniards who choſe to remain were allowed the ſame privileges they had enjoyed under the reign of Charles II. The works were found very ſtrong, and the place well provided with ammunition and military ſtores.

5 Beſieged the ſame year by the Marquis de Villadarias.

6 The garriſon ſupplied with reinforcements and proviſions by Sir John Leake.

This conqueſt was atchieved with the loſs of about 60 killed and 216 wounded on the part of the Engliſh. The prince of Heſſe remained governor; and 18 men of war were left at Liſbon under the command of Sir John Leake, to ſuccour the garriſon if there ſhould be occaſion. The loſs of ſuch an important fortreſs, however, having alarmed both the courts of Madrid and Paris, orders were ſent to the marquis de Villadarias, a Spaniſh grandee, to lay ſiege to it, in which he was to be aſſiſted by a naval force from Toulon. The prince immediately applied to Sir John Leake for aſſiſtance: but before the latter had time to comply with his requeſt, a French fleet arrived, and debarked ſix battalions to the aſſiſtance of the Spaniards; after which they proceeded to the weſtward, leaving only ſix frigates in the bay. The trenches were opened on the 11th of October, about which time Sir John arrived with 20 ſail of Engliſh and Dutch ſhips; but hearing that the French were about to attack him with a ſuperior force, he judged it proper to return and refit. Having very prudently left orders at Liſbon to make preparations for this purpoſe in his abſence, he was enabled to acccompliſh the work with ſuch expedition, that on the 29th of the ſame month, he returned, and ſurpriſed in the bay three frigates, a fire-ſhip, two Engliſh prizes, a tartan, and a ſtore-ſhip. After this exploit he landed ſome reinforcements, ſupplied the garriſon with ſix months proviſion and ammunition; at the ſame time detaching on ſhore a body of 500 ſailors to aſſiſt in repairing the breaches which had been made by the enemy's fire.

7 Deſperate attempt of ſome Spaniſh volunteers.

8 They are all killed or taken.

Thus the Spaniards were diſappointed in their hopes of ſucceſs from an attack which had been projected that very night, and for which purpoſe 200 boats had been collected. Still, however they did not deſpair; and ſuppoſing that the garriſon would be off their guard and ſecure on account of the vicinity of their fleet, they formed the raſh deſign of attempting to ſurpriſe the place though the Britiſh admiral was ſtill before it. In this mad attempt 500 volunteers aſſociated, taking the ſacrament never to return unleſs they accompliſhed their purpoſe. They were conducted by a goat-herd to the ſouth ſide of the rock near the cave-guard, at that time called *the paſs of locuſt-trees*. This they mounted, and lodged themſelves the firſt night in the Cave of St Michael; the next they ſcaled Charles V.'s Wall; ſurpriſed and maſſacred the guard at Middle-hill: where afterwards, by ropes and ladders, ſeveral hundreds of the party deſigned to ſupport them were hauled up; but being diſcovered, they were attacked by a ſmall party of grenadiers, and all of them at laſt either killed or taken. Theſe brave adventurers were to have been ſupported by a body of French troops, and ſome feints were propoſed to draw off the attention of the garriſon; but, through the diſagreement of the commanding officers, theſe propoſals were not put in execution, and thus the volunteers were left to their fate.

9 The ſiege ſtill continued.

10 The garriſon reinforced.

Notwithſtanding theſe misfortunes the Spaniards ſtill continued the ſiege, and fitted out a ſtrong ſquadron from Cadiz, with a deſign to intercept the convoys of proviſions which might be ſent to the garriſon: flattering themſelves at the ſame time, that on the arrival of their fleet, Sir John would be obliged to retire, and the garriſon of conſequence to ſurrender to their united attacks. They continued their fire therefore with additional fury, diſmounted many of the cannon, and did eſſential injury to the works in ſeveral different places. The prince of Heſſe, however, was by no means deficient in his endeavours to diſappoint their expectations. As it was probable that an attempt might be made to ſtorm the curtain, a cuvette was dug in the ditch which was filled by the tide, and a double row of paliſades placed parallel to the works. The chambers of the mine under the glacis were loaded, and all means taken to defeat ſuch an attempt; but on a ſudden the Spaniards ſeemed to have altered their deſign, and threatened an attack on the lines which the garriſon had on the declivity of the hill to flank the glacis, and overlook their advanced works. While affairs remained in this ſituation, part of the ſuccours they had long expected arrived in the bay, December 7. 1704, and in two days after, the remainder came in with near 2000 men, along with a proportionable quantity of ammunition and proviſions. Theſe had ſailed from Cape Spartel under convoy of four frigates; but were in imminent danger of falling into the hands of the enemy, whoſe fleet they miſtook for their own; however they eſcaped by the fortunate circumſtance of being becalmed, ſo that they could not get up to them.

11 Vigorous attack by the Spaniards.

Sir John Leake having thus powerfully reinforced the garriſon, thought his preſence in the bay no longer neceſſary, and therefore ſet ſail for Liſbon, where he arrived about the end of the year. In the beginning of January 1705 the Spaniards were reinforced by a conſiderable body of infantry, and on the 11th of the month made an attack on the extremity of the King's Lines, but were repulſed. The attack was renewed next day with 600 grenadiers, French and Walloons, ſupported by 1000 Spaniards under lieutenant-general Fuy. They diſpoſed themſelves in ſuch a manner as ſhowed an intention to ſtorm a breach which had been made in the Round Tower at the extremity of the King's Lines, and another in the entrenchment on the hill. The retrenchment which covered the latter breach, with part of the entrenchment joining the precipice of the rock, was defended at night by a captain, three ſubalterns, and 90 men: but it was cuſtomary for the captain to withdraw, with two ſubalterns and 60 men at day-break. The Round Tower was defended by 180 men, commanded by a lieutenant colonel. The marquis, by deſerters from the garriſon, had obtained intelligence of the ſtrength of theſe poſts, and planned his attack accordingly. The de-

detachments for the upper breach mounted the rock at midnight, and concealed themſelves in the clifts until the captain had withdrawn; after which, advancing to the point of the entrenchment, they threw grenades on the ſubaltern and his party, ſo that they were obliged to leave the place. At the ſame time 300 men ſtormed the Round Tower, where lieutenent-colonel Bar made a vigourous defence, though the enemy, having paſſed the breach above, annoyed them on the flanks with great ſtones and grenades. Obſerving, however, the Spaniards marching down to cut off his retreat from the town, he retired; and, by getting over the parapet of the King's Lines, deſcended into the covered way, where the Engliſh guards were poſted. Thus the garriſon were alarmed; all the regiments were aſſembled at their proper poſts; and captain Fiſher endeavoured to ſtop the progreſs of the enemy with 17 men, but they were repulſed, and himſelf taken priſoner. At laſt, however, the Tower was retaken by lieutenant-colonel Moncal at the head of 400 or 500 men, after it had been in the poſſeſſion of the enemy upwards of an hour.

12 They are repulſed.

13 The ſiege carried on with freſh ardour.

The garriſon were now farther reinforced by ſix companies of Dutch troops and 200 Engliſh ſoldiers, together with ſome proviſions and ſtores. The aſſailants, however, were ſtill determined to go on. The marquis de Villadarias was ſuperſeded by the Mariſchal Teſſe a Frenchman, with whom Admiral Pointis was deſired to co-operate in blocking up the place. The Mariſchal therefore joined the army with four freſh battalions, beſides eight companies which had been ſent before: the ordnance, which had been greatly injured by conſtant uſe, was exchanged for others, and the works as they then ſtood, put into the beſt repair. On the part of the Engliſh a reinforcement was ordered under the command of Sir Thomas Dilkes and Sir John Hardy, to join Admiral Leake at Liſbon; which junction being effected, the whole fleet, conſiſting of 28 Engliſh, 4. Dutch, and 8 Portugueſe men of war, having on board two battalions of land-forces, ſet ſail from Liſbon. Happily for the beſieged, however, the inceſſant rains and ſtorms about this time had retarded the operations of the land-forces, and greatly diſtreſſed the fleet of the enemy. Eight ſhips of the latter were forced from their anchors by the ſtrong weſterly wind, and obliged to drive aloft. At this critical period Sir John Leake, with the allied fleet, entered the ſtraits. On his approach the few remaining French ſhips put out to ſea; and the Britiſh admiral diſcovering five ſail making out of the bay, and a gun fired at them from the garriſon, immediately gave chace. Three French men of war were taken, and the admiral's ſhip and another driven on ſhore, where they were burnt. The reſt, on hearing the report of the guns, had made the beſt of their way to Toulon.

14 The French fleet diſperſed by a ſtorm,

15 The ſiege turned into a blockade, and at laſt raiſed.

The garriſon was now ſo well ſupplied, that Marſhal Teſſe withdrew his troops from the trenches, and formed a blockade, drawing an intrenchment acroſs the iſthmus to prevent the garriſon from ravaging the country. The prince of Heſſe remained for ſome time in the place where he repaired the batteries, and made ſome additions to the fortifications; after which he joined the arch-duke Charles at Liſbon. As the latter, however, was reſolved to try his fortune with the Earl of Peterborough in Valencia and Catalonia, the prince was ſent back to Gibraltar to prepare part of the garriſon for embarkation, and ſoon after was followed by the whole fleet. Major General Ramos was now appointed governor of Gibraltar, in which only two new battalions were left, as nothing was to be feared from the enemy. The new governor, however, brought with him 400 men for the greater ſecurity of the place; but ſoon reſigned his government to Colonel Roger Elliot, during whoſe time Gibraltar was made a free port by a ſpecial order from the queen.

16 A new attack threatened by the Spaniards in 1720,

Colonel Elliot was ſucceeded by colonel Congreve before the year 1714, and he by Colonel Cotton a ſhort time after. In 1720 the Spaniards ſeem to have threatened another attack. Ceuta, a Spaniſh fortreſs in Barbary, had been for many years beſieged by the Moors; and a powerful armament, commanded by the marquis de Lada, was now aſſembled in Gibraltar-bay, under pretence of relieving the African fortreſs, but with a ſecret deſign of firſt ſurpriſing Gibraltar; for which purpoſe they had provided ſcaling ladders, &c. The armament, however, had not been fitted out with ſuch ſecrecy, but that the Britiſh miniſtry had intelligence of it. On this they ſent orders to colonel Kane, governor of Minorca, to embark with part of his garriſon for Gibraltar under convoy of the fleet in the Mediterranean. On his arrival he found the place in a critical ſituation. The garriſon conſiſted only of three weak battalions under major Hetherington, beſides whom there was only one other field officer, major Baiteroux, in the place, and no more then 14 days proviſions remaining. The poſture of affairs, however, was altered by the arival of colonel Kane with 500 men with proviſions and ammunition; which reinforcement, together with the ſpirited behaviour of the Britiſh commodore, induced the Spaniſh commander to abandon his deſign, though he remained of opinion that the fortreſs might then have been carried by a general aſſault.

17 The deſign given up,

18 Another attempt in 1726,

Notwithſtanding this diſappointment, the Spaniards continued to keep a watchful eye over Gibraltar; and, in the latter end of the year 1726, aſſembled an army in the neighbourhood of Algeſiras, encamping, on the 20th of January following, on the plain below St Roch, and erecting a battery on the beach to protect their camp. Though admiral Hopſon was then at anchor in the bay of Gibraltar, yet as he had received no intelligence of the actual commencement of hoſtilities between Britain and Spain, he was obliged to allow the boats of the latter to paſs with proviſions, arms, and ammunition, between Algeſiras and the camp, at the ſame time that colonel now brigadier Kane, who had been a ſecond time ſent from Minorca, lay under ſimilar embarraſſments. The operations of the Spaniards however ſeemed ſo evidently to tend towards an attack, that the governor thought proper to order ſuch of that nation as were in the town to leave it, and to forbid their galleys to anchor under his guns (A).

The count de Las Torres commanded the Spaniſh forces

(A) At this time the fortifications of Gibraltar were conſiderably different from what they had been in 1705 Several forces, amounting to near 20,000 men; and ſoon after forming his camp, he advanced within reach of the garriſon. The brigadier then deſired him to keep out of his reach, otherwiſe he ſhould do his utmoſt to force him; but to this the Spaniſh commander replied, that, as the garriſon could command no more than they had power to maintain, he ſhould obey his catholic majeſty's orders, and encroach as far as poſſible. Hoſtilities, however, were not commenced until the 10th of February 1727, when the Spaniards, having brought materials for batteries to the old wind-mill on the neutral ground, it was determined in a council of war, that the Spaniſh general had commenced hoſtilities by incroaching ſo far on the liberties of the garriſon. Still, however, the governor ſent to the count to knew the reaſon of breaking ground before the garriſon; but received for anſwer, that "he was in his maſter's territories, and was not anſwerable to any other perſon for his conduct." On this the governor opened the batteries of the Old Mole and thoſe of Willis upon the Spaniſh workmen; however, they perſiſted in carrying on their operations, and at night marched a party down to the Devil's Tower, where they immediately broke ground, and began a communication with their other works. The governor was now informed by ſome deſerters, that the enemy were forming a mine in a cave under Willis's battery, with a deſign to blow it up: but the plot being thus happily diſcovered, a party was immediately ſtationed to cut off the communication. On the 22d of February the Spaniards opened on the garriſon with 17 pieces of cannon beſides mortars; and the day following brigadier Kane left Gibraltar to ſend a reinforcement from Minorca. On the 3d of March the enemy opened a new battery of 22 guns on the Old Mole, and on the 8th another of 15 guns, bearing alſo upon the ſame Mole, the guns of which had annoyed the weſtern flank of their approaches.

All this time the garriſon had kept up a conſtant and well directed fire from the batteries which bore upon the works of the enemy; but the ordnance in general being old, were frequently burſting; by which they ſuffered more than from the fire of the beſiegers. The latter were alſo greatly diſtreſſed by the fleet under admiral Hopſon and Sir Charles Wager, who, ſince the beginning of the ſiege, had intercepted their homebound ſhips, and at the ſame time greatly benefited the garriſon by bringing the prizes into the bay. Finding the Spaniards, however, obſtinately bent on their enterpriſe, they formed a deſign on the ſecond of April, to bombard Algeſiras, from whence the beſieged were ſupplied with various articles of ammunition; but the fleet happening to be becalmed, the deſign was afterwards unaccountably abandoned; and on the arrival of a reinforcement from Minorca, they ſailed to the weſtward, leaving the garriſon to defend themſelves the beſt way they could.

The enemy continued to augment their batteries, and erect new ones, until they amounted at laſt to 60 cannon beſides mortars; and, on the 3d of May, the governor received intelligence that a general aſſault was intended; to repel which he took every proper precaution. The enemy, however, ſtill added to their approaches, and conſiderable reinforcements were received by both parties. Hoſtilities, however, ceaſed on the 12th, when news arrived that the preliminaries of a general peace were ſigned; ſince which time to the year 1779 no farther attempts were made on Gibraltar. In the courſe of theſe two ſieges the loſs of the Spaniards was very conſiderable; that of 1705 coſting them not leſs than 10,000 men, including thoſe who died of ſickneſs; and in that of 1727 their loſs was computed at near 3000, beſides caſualties, which could not be aſcertained. That of the garriſon amounted in 1705 to 400; and in of 1727 to 300; a very ſmall number, conſidering that during the ſiege 70 cannon and 30 mortars burſt on the batteries.

19 Ceſſation of hoſtilities.

20 Great loſs of the Spaniards in their attempts.

21 Gibraltar blocked up in 1779.

The hoſtile manifeſto preſented by the Spaniſh ambaſſador to the court of London at the commencement of the late war, was ſoon followed by an interruption of communication betwixt Spain and the fortreſs of Gibraltar. No direct intention of attacking or diſtreſſing it, however, was manifeſted till the 16th of July, when the port was completely blocked up by a ſquadron of two 74 gun ſhips, ſeveral frigates, galleys, &c. Ten days after they began to form a camp on the plain below St Roch, three miles from the fortreſs. The garriſon at this time conſiſted of 5382 men, including officers, with a company engineers and artificers; but the greateſt expectations were formed from the abilities and valour of general Elliot the governor. As ſoon as the breaking off the communication with Spain indicated approaching hoſtilities, the governor took every precaution that could be ſuggeſted by military wiſdom; but though informed of the rupture betwixt the two courts having actually taken place, and though he beheld the hoſtile operations of the enemy, no means were uſed to interrupt them till the 12th of September, when the batteries of Green's Lodge, Willis, and Queen Charlotte, were opened for a few hours, with a view to diſturb the workmen.

22 Hoſtilities commenced by the garriſon.

From this time to the beginning of the year 1780 the enemy continued the blockade both by ſea and land, but without doing any damage to the works or garriſon; and it was not until the 12th of January that a ſingle perſon was wounded. This happened to be a woman, who, paſſing near one of the houſes, was ſlightly hurt by a ſhot from the enemy. In the mean time, however, the uſual ſupplies of proviſions being cut off, the garriſon began to feel all the horrors of famine. All the neceſſaries of life were very ſcarce, and to be procured only at exorbitant prices. Veal, mutton, and beef, ſold from half a crown to four ſhillings per pound; freſh pork from two to three ſhillings; ſalted beef and pork fifteen pence; fowls eighteen ſhillings per couple; ducks a guinea; fire-wood, five ſhillings per hundred weight; a pint of milk and water fifteen pence; a ſmall cabbage coſt five ſhillings, and a ſmall bunch of outer leaves five pence; Iriſh butter half a crown per pound; candles as much; and eggs ſixpence each. As the rock, however, is almoſt ſur-

23 A woman firſt wounded in the fortreſs.

24 Exceſſive dearneſs of proviſions.

Several works were erected on the heights above the lines called *Willis's Batteries*; the prince's Lines were extended to the extremity of the rock, and an inundation was formed out of the moraſs in front of the grand battery.

rounded by the ſea, it was natural to ſuppoſe, that in ſuch a ſcarcity of other proviſions great benefit would have been derived from the ocean; but the fiſhermen, being all foreigners, and under no regulation, took advantage of the preſent ſcarcity of proviſions in the garriſon to exact a moſt exorbitant price for the fiſh they ſupplied.

25
The Spaniſh fleet defeated and their admiral taken by Rodney.

Had matters remained long in this ſtate, it is plain that the fortreſs, however ſtrong, muſt have fallen into the hands of the enemy. They were, however, effectually relieved in conſequence of the victory gained by admiral Rodney over the Spaniſh fleet commanded by Don Juan de Langara. The former had been furniſhed with a ſtrong ſquadron, in order to relieve this important fortreſs: with which having ſet ſail, he in a few days fell in with a Spaniſh fleet of 16 tranſports bound from Bilboa to Cadiz, and laden with proviſions and naval ſtores, convoyed by a man of war of 64 guns, four frigates, and two armed veſſels. Of theſe only a ſingle tranſport eſcaped, the reſt being all captured on the 8th of January 1780; and the loſs of them, at the ſame time that it promiſed to be very ſerviceable to the garriſon, was equally detrimental to the enemy, who were now in great want both of proviſions and materials for their ſhipping.

This advantage was ſoon after followed by a much greater. On the 16th of the ſame month, a Spaniſh ſquadron of 11 ſail of the line was diſcovered off Cape St Vincent; and the Britiſh admiral having taken the proper methods to come up with them as quickly as poſſible, an engagement took place about four in the afternoon. At this time the headmoſt ſhips of the Britiſh line cloſed in with the neareſt of the enemy, and in half an hour one of the Spaniards, mounting 70 guns, and having on board 600 men, blew up, and all on board periſhed. In two hours more another Spaniſh ſhip of the line was taken; notwithſtanding which the fight continued with great vigour till two in the morning, when the headmoſt ſhip of the enemy ſtruck to the Sandwich; after which the firing ceaſed. The weather throughout the night was ſo tempeſtuous that it was with the utmoſt difficulty the Britiſh could take poſſeſſion of thoſe ſhips which ſurrendered. Theſe were ſix in number, but two of them drove aſhore and were loſt, only four being brought ſafe into Gibraltar. Theſe were the admiral's ſhip of 80 guns and 700 men, with three others of 70 guns and 600 men. The engagement, however, happened ſo near the ſhore, and the Britiſh were ſo eager in ſecuring the lee-gage to prevent the enemy's eſcape, that Admiral Rodney's ſhip, together with ſome of the largeſt in the fleet, were in great danger of running on the ſhoals of St Lucar; nor could they be got into deep water again without much labour and the exertion of great naval ſkill. It was the opinion of all who were preſent in the action, that had this engagement happened in the day-time, or had the weather been leſs boiſterous, not one of the Spaniſh ſhips could have eſcaped; and even as it was, thoſe which got off were ſo eſſentially damaged as to be unfit for ſervice.

26
The garriſon relieved and reinforced.

The news of this important victory arrived at Gibraltar on the evening of the day after it was fought; and in two days more the garriſon was completely relieved by the arrival of the fleet and convoy, at the ſame time that they were farther reinforced by a regiment of highlanders, conſiſting of 1051 men, officers included. An opportunity was alſo taken of ſending away with the fleet all the invalids and women in the garriſon; with whom they ſet ſail on the 10th of February, leaving in the bay only the Edgar and Panther ſhips of the line, with two frigates.

23
The garriſon again reduced to ſtraits.

28
Unſucceſsful attempt to burn the Britiſh ſhipping.

On the departure of the Britiſh fleet the blockade was immediately reſumed; and notwithſtanding the ample ſupplies lately received, the garriſon ſoon began again to experience the inconveniency of wanting freſh proviſions. It had hitherto received theſe in abundance from the coaſt of Barbary; but an unaccountable alteration had now taken place, ſo that the friendſhip of the emperor of Morocco was transferred from Great Britain to Spain in a manner totally unprecedented. His partiality towards the latter was the more ſurpriſing, as Britain had given no provocation, and the enmity between Spain and Morocco ſeemed to be in a manner conſtitutional, and founded upon ſuch cauſes as could never ceaſe to operate. Thus, however, the garriſon became daily more and more diſtreſſed, from being obliged to make conſtant uſe of their ſalt proviſions, and even this with the ſtricteſt economy. The induſtry and reſolution of the Britiſh ſeamen and officers, indeed, ſometimes overcame all obſtacles, ſo that they found means to procure the neceſſary refreſhments; though in ſo doing they were certainly expoſed to the utmoſt danger from the enemy. At the ſame time the defence of the garriſon was ſo vigorous, that while it continued to be ſupplied even in this ſcanty manner, the Spaniards began to loſe all hope of reducing it; for which reaſon they formed a project of burning all the Britiſh ſhipping in the bay. The night appointed for putting this ſcheme in execution was the 6th of June 1780, when ten fire-ſhips favoured by an uncommon darkneſs, ſtood over from the Spaniſh to the Britiſh ſide of the bay. Their deſign was to ſet fire to the ſtorehouſes neareſt to the water ſide, as well as to the ſhipping there; but having been too precipitate in firing their ſhips, and being received alſo by a very heavy cannonade, the attempt was fruſtrated. On this occaſion the ſkill and intrepidity of the Britiſh ſeamen was eminently diſplayed. Having manned their boats, they grappled the fireſhips already in flames; and, notwithſtanding their dreadful appearance and the danger of their exploding, towed them clear of the veſſels under the walls, and extinguiſhed them.

29
Spaniſh works deſtroyed.

The failure of this project was a grievous diſappointment to Don Barcelo, the Spaniſh admiral, who lay ready with his ſquadron to intercept the Britiſh veſſels that might attempt to eſcape; at the ſame time that the batteries on their lines were in readineſs to bombard the town, if the fire-ſhips had ſucceeded in cauſing any conflagration on ſhore. The failure of the preſent attempt, however, was ſoon followed by other diſaſters. As ſoon as they had, with great labour, puſhed forward their new works, and conſtructed new batteries, they were certainly deſtroyed by the beſieged; and their mortification on theſe occaſions was the greater, as it was uſual for the governor to allow them to complete their works before he commenced his deſtructive operations. Thus the labour of many days were often loſt in a few hours, and afterwards was to be reſumed with as little proſpect of ſucceſs as before.

fore.

30
The garriſon annoyed by the Spaniſh gun-boats.

The garriſon were now conſiderably annoyed by the Spaniſh gun-boats, to which indeed the ſhipping were equally expoſed with themſelves. Theſe were veſſels from 30 to 40 tons burden, conſtructed ſo that they lay low in the water, which rendered them difficult to be aimed at. They had 13 oars on a ſide, carried 40 or 50 men, with a 26 pounder on the prow; and, from the facility of managing them, two were deemed, in calm weather, to be a match for a frigate of moderate ſize. All their efforts, however, could ſtill do no more than to reduce the garriſon to great ſtraits for want of proviſions; and to this dreadful inconvenience the Britiſh ſubmitted with the greateſt cheerfulneſs.

31
The ſcurvy rages in the garriſon.

From the time of Admiral Rodney's departure in the month of February 1780 to the month of October, almoſt the only proviſions in the garriſon were ſuch as tended to produce the ſcurvy; which accordingly raged in ſuch a manner as to threaten the moſt fatal conſequences. An antidote, however, was happily procured by the capture of a Daniſh dogger from Malaga laden with lemons and oranges, which the governor immediately purchaſed for the uſe of the garriſon, and diſtributed among them. "At this time (ſays Captain Drinkwater) the ſcurvy had made dreadful ravages in our hoſpitals, and more were daily confined; many, however, unwilling to yield to its firſt attacks, perſevered in their duty to the more advanced ſtages. It was therefore not uncommon, at this period, to ſee men, who, ſome months before, were hale, and capable of enduring any fatigue, ſupporting themſelves to their poſts upon crutches, and even with that aſſiſtance ſcarcely able to move along. The moſt fatal conſequences in ſhort were to be apprehended to the garriſon from this terrible diſorder, when this Dane was happily directed to our relief."

32
Cairncroſs's account of it.

According to Mr Cairncroſs, an eminent ſurgeon, who was preſent during this ſiege, "the ſcurvy, which now raged in Gibraltar, differed in no reſpect from that diſeaſe uſually contracted by ſailors in long ſea-voyages; and of which the immediate cauſe ſeemed to be the ſubſiſting for a length of time upon ſalted proviſions only, without a ſufficient quantity of vegetables or other aceſcent foods. The circumſtances related in the voyage of that celebrated circumnavigator Lord Anſon, of conſolidated fractures diſuniting, and the calloſity of the bone being perfectly diſſolved, occurred frequently in our hoſpitals, and old ſores and wounds opened anew from the nature of the diſorder. Various antiſcorbutics were uſed without ſucceſs, ſuch as acid of vitriol, ſour crout, extract of malt, eſſence of ſpruce, &c.; but the only ſpecifics were freſh lemons and oranges given liberally; or, when they could not be procured, the preſerved juice in ſuch quantities, from one to four ounces per day, as the patient could bear. Whilſt the lemons were found, from one to three were adminiſtered each day as circumſtances directed. The juice given to thoſe in the moſt malignant ſtate was ſometimes diluted with ſugar, wine, or ſpirits; but the convaleſcents took it without dilution. Women and children were equally affected, nor were the officers exempted from this dreadful diſorder. It became almoſt general at the commencement of the winter ſeaſon, owing to the cold and moiſture; and in the beginning of ſpring when vegetables were ſcarce.

33
Method of preſerving lemon juice.

The juice was preſerved by adding to 60 gallons of expreſſed liquor about five or ten gallons of brandy, which kept it in ſo wholeſome a ſtate, that ſeveral caſks were opened in good condition at the cloſe of the ſiege. The old juice, however, was not ſo ſpeedily efficacious as the fruit, though by perſevering longer in its uſe it ſeldom failed."

34
The garriſon diſtreſſed for want of proviſions.

Till this month the allowance of ſalt proviſions had continued undiminiſhed; but now it was judged neceſſary to reduce the allowance of bread and meat, and to make ſome other regulations in order to enforce the ſtricteſt economy with regard to food. Every thing of this kind that could be practiſed, however, ſeemed inſufficient to preſerve the garriſon from abſolute want. In the beginning of the year 1781 proviſions became exceedingly ſcarce, by reaſon of the almoſt total expenditure of what was contained in the public ſtores, and the vigilance of the enemy's cruizers. About the middle of February the town bakers left off work for want of flour; and many of the poorer ſort wanted bread. The price of freſh proviſions again roſe to a moſt enormous height. Small pigs ſold at two guineas: turnkeys at three; geeſe at 30 ſhillings; fowls and ducks at 10 ſhillings; damaged biſcuit a ſhilling the pound; peaſe 18d.; and all other neceſſaries in proportion; at the ſame time the ſcarcity of fuel was ſuch, that it was ſometimes ſcarcely procurable in quantity ſufficient to dreſs the victuals.

35
The garriſon entirely deprived of the uſe of the neutral ground

The garriſon had hitherto derived aſſiſtance occaſionally from the gardens on the neutral ground, tho' vaſt quantities of vegetables had been removed thence by the enemy. Towards the end of the month of October 1780, however, the Spaniards determined to expel the Britiſh from the gardens entirely; and this they accompliſhed in ſpite of all that could be done to prevent them. From this time the reſources with regard to vegetables depended entirely upon the attention paid to cultivation; which, happily for the garriſon, was attended with ſuch ſucceſs, eſpecially during the winter months, that the produce came at laſt to be nearly equal to the demands.

36
Supplied by the Britiſh fleet.

At laſt, on the 12th of April 1781, ſupplies were brought by the Britiſh fleet under admirals Darby, Digby, and Roſs, though they could not be got in without great difficulty. The gun-boats already mentioned were now much increaſed in number and ſtrength of conſtruction; infeſting the bay in ſuch a manner as greatly to interrupt the debarkation of the ſtores. As no veſſels of the ſame kind had been prepared to oppoſe them, they could ſcarce be prevented from effecting their purpoſe of burning the ſtore-ſhips. With this view they had approached them every morning in hazy weather to the number of between 20 and 30, ſeveral of them carrying mortar-pieces; and as they uſed both ſails and oars, they eluded all purſuit, by withdrawing on the riſe of any breeze. To keep off theſe troubleſome gueſts ſeveral ſtout frigates were obliged to ſtation themſelves along the bay for the protection of the ſhipping; but even this did not prevent them from continuing their moleſtation; and notwithſtanding the vigilance and activity of the Britiſh ſailors, it was ſeldom that they could come near enough to do them any damage.

37
The Spaniards reſolve to exert themſelves to the utmoſt.

In ſpite of all their endeavours, however, the garriſon was effectually relieved; an exploit which ſo exceedingly irritated the court of Spain, that they determined to exert the utmoſt force of the kingdom rather than fail in the execution of their favourite project. The works before the town were therefore carried on with more vigour than ever, and the moſt tremendous preparations made to cauſe the obſtinate garriſon feel the reſentment of an exaſperated enemy. Their batteries were now mounted with guns of the heavieſt metal, and with mortar-pieces of the largeſt ſize; the number of the former augmented to near 200, and of the latter to upwards of 80. For three weeks this prodigious artillery continued to pour fourth an almoſt inceſſant ſhower of ſhot and ſhells, inſomuch, that, in the time juſt mentioned, they had conſumed 100,000 lb. of gunpowder, and thrown into the town four or five thouſand ſhot or ſhells every 24 hours.

38
The town entirely deſtroyed.

By ſuch an immenſe bombardment the town was almoſt totally laid in ruins. The inhabitants, computed at more than 3000 in number, experienced every difficulty that could ariſe from the deſtruction of their habitations: ſeveral of them were killed, and all forced to leave the town, and take ſhelter under tents with what accommodation could be provided for them in ſuch ſcenes of horror and confuſion. Numbers took the opportunity of retiring with the fleet; while many that remained were now reduced from a ſtate of opulence to the greateſt diſtreſs. The conduct of Governor Elliot was very humane and compaſſionate to ſuch as were obliged to ſtay; allowing them a free paſſage to England, and ſupplying them with proviſions for the voyage.

59
Diſorderly behaviour of the ſoldiers.

During this bombardment, not only the greateſt part of the effects belonging to the inhabitants were deſtroyed, but the fortifications were in many places greatly injured; and the worſt was, that the remainder were deſtroyed by the ſoldiers, who had arrived at ſuch a pitch of licentiouſneſs, that they neither regarded nor would obey their officers. They were incited to this deſtructive ſcheme by the avarice of ſome of the inhabitants who had hoarded up and concealed a quantity of neceſſary articles, in order to procure an advanced price. They now, therefore, kept no bounds in diſſipation, waſte, and extravagance; a remarkable inſtance of which is given by Captain Drinkwater, in their roaſting a pig by a fire made of cinnamon. To put a ſtop to theſe atrocious proceedings, rigorous meaſures were of neceſſity adopted; and it was intimated, that any ſoldier convicted of being drunk or aſleep upon his poſt, or found marauding, ſhould be immediately executed. The loſs of human lives during this dreadful bombardment was leſs than could have been expected; but many remarkable circumſtances are taken notice of by Captain Drinkwater, ſome of which are related in the note (B)

(B) Two boys belonging to the artificer company were endowed with ſuch wonderful ſtrength of viſion, that they could ſee the ſhot of the enemy in the air almoſt as ſoon as it came from the mouth of the gun; and were therefore conſtantly placed upon ſome part of the works to give notice to the ſoldiers of the approaching danger. During the time of the hotteſt fire, however, the men were ſo habituated to the fall of ſhells and ſhot around them, that they contracted an inſenſibility of danger, and almoſt required to be cautioned by their officers to avoid the exploſion of a ſhell when lying with the fuſee burning at their feet. In conſequence of this inattention, they frequently neglected the advice of the boys abovementioned, and their neglect could not but be productive of fatal effects. An inſtance of this happened on the Princeſs Amelia's battery, where a ſhot thus diſregarded came through one of the capped embraſures, carried off one of the legs from three ſoldiers, and wounded a fourth in both. In other caſes, in which the perſons themſelves have obſerved the ſhot or ſhells coming towards them, they have been faſcinated by its appearance, and unable to move from the ſpot, as ſmall birds are ſaid to be by the rattle-ſnake. "This ſudden arreſt of the faculties (ſays our author) was nothing uncommon: ſeveral inſtances occurred to my own obſervation, where men, totally free, have had their ſenſes ſo engaged by a ſhell in its deſcent, that though ſenſible of their danger, even ſo far as to cry for aſſiſtance, they have been immoveably fixed to the place. But what is more remarkable, theſe men have ſo inſtantaneouſly recovered themſelves on its fall to the ground, as to remove to a place of ſafety before the ſhell burſt." In this manner Lieutenant Lowe of the 12th regiment was faſcinated by a ſhot which he ſaw coming, but had not power to remove from the place before it fell upon him and took off his leg.

Where theſe ſhells burſt they produced inſtant and certain deſtruction, mangling in the moſt dreadful manner. The following are ſome inſtances. A matroſs had the misfortune of breaking his thigh by ſome accident; and being a man of great ſpirit, could ſcarce bear the confinement neceſſary for its reunion. In conſequence of this he went abroad too ſoon, and thus unfortunately broke the bone a ſecond time. Being now confined to bed, a ſhell happened to fall into the room where he was, and, rebounding, lodged itſelf directly upon him. The convaleſcents and ſick inſtantly ſummoned all their ſtrength, and crawled out of the room, while the poor matroſs lay below the ſhell, kept down by its weight, and utterly unable to ſtir. In a few ſeconds it burſt, and took off both his legs, and ſcorched him in a dreadful manner. He ſurvived the exploſion, was ſenſible to the laſt moment, and died regretting that he had not been killed on the batteries. The caſe of a ſoldier of the 73d regiment ſhows that even in the moſt dangerous caſes we ſhould never deſpair of recovery while life remains. This unfortunate man had been knocked down by the wind of a ſhell, which, inſtantly burſting, killed his companion, and mangled himſelf in a ſhocking manner. His ſkull was dreadfully fractured, his left arm broken in two pieces, one of his legs ſhattered, the ſkin and muſcles torn off from part of his right hand, the middle finger broken to pieces, and his whole body moſt ſeverely bruiſed and marked with gunpowder. He preſented ſo horrid an object to the ſurgeons, that they had not the leaſt hopes of ſaving his life, and were at a loſs what part to attend to firſt. He was that evening trapanned; a few days afterwards his leg was amputated, and other wounds and fractures were dreſſed. Being poſſeſſed of a moſt excellent conſtitution, nature performed wonders in his favour, and in 11 weeks his cure was completely effected. On the 18th of September a ſhell from the lines fell into a houſe where the town-major captain Burke, with majors Mercier

By the beginning of June 1781, the enemy had relaxed conſiderably in their firing, ſeldom exceeding 600 ſhot in a day; and continued gradually to diminiſh this number ſo remarkably, that towards the end of Auguſt they ſeldom fired in the day, and only diſcharged ſix or ſeven, and ſometimes not above three, ſhot in the night. The batteries at land, however, were ſucceeded by the gun-boats; which renewed their attacks every day, keeping the garriſon in continual alarm, and never failing to do more or leſs execution. To reſtrain them, therefore, a battery of guns capable of throwing their ſhot to a great diſtance was erected as near as poſſible to the enemy; and as it reached their very camp, it was determined to open it upon them as often as the gun-boats made their attacks; which being ſoon perceived, they thought it prudent to deſiſt in ſome meaſure from that mode of hoſtility.

40
The works of the enemy brought to the utmoſt perfection.

They continued ſtill, however, to improve their works, and for this purpoſe employed the beſt engineers both of France and Spain; ſo that by the latter part of November 1781, they had them brought to ſuch a ſtate of perfection as filled both kingdoms with the moſt ſanguine expectations of ſucceſs. Governor Elliot, however, far from being diſmayed at theſe formidable bulwarks, ſuffered them to proceed without moleſtation to the end of their ſcheme, that he might as in a moment deſtroy the labour of ſo many months, and thus render the diſappointment the greater.

41
They are entirely deſtroyed.

In the night of the 27th of November, a choſen party of 2000 men was detached, in order to deſtroy the enemies works and batteries; and their ſucceſs was equal to their moſt ſanguine expectation. They marched out in great order and ſilence about two o'clock in the morning, under the command of brigadier-general Roſs; after which they proceeded with the ſame circumſpection, but with the utmoſt celerity, to the enemy's works, which they ſtormed and overthrew with aſtoniſhing rapidity. The Spaniards were inſtantly thrown into confuſion, and fled on every ſide; the guns and mortars on the batteries were all ſpiked up; and the artillery men, artificers, and ſailors, exerted themſelves ſo vigorouſly, that in the ſpace of an hour the magazines were blown up, the ſtore-houſes of arms, ammunition, and military implements of every kind, and all the works that had been conſtructed, were ſet on fire, and totally conſumed; the whole damage done on this occaſion being eſtimated at upwards of two millions ſterling.

For ſeveral days after this diſaſter the Spaniards continued inactive, without even making any attempt to extinguiſh their batteries, which ſtill continued in flames; but in the beginning of December, as if ſuddenly arouſed from their reverie, upwards of 1000 men were ſet to work in order to prepare a great number of faſcines, from whence it was concluded that they deſigned to repair their works. In this they proceeded with their uſual perſeverance and diligence; but as the former methods of attack had conſtantly failed, it was evident, that if the place could be reduced at all, it muſt be by ſome means hitherto unattempted; and for the reduction of this ſingle fortreſs, the Spaniſh monarch, after the conqueſt of Minorca, determined to employ the whole ſtrength of his empire.

42
Floating batteries invented by the chevalier D'Arcon.

Among the various projects formed at this time, that of the chevelier D'Arcon, a French engineer of diſtinction, proved the moſt acceptable to the court of Spain; and though the expence attending it was immenſe, this ſeemed in the preſent circumſtances to be but a matter of ſmall conſideration. His plan was to conſtruct ſuch floating batteries as might neither be liable to be ſunk nor ſet on fire. With this view their bottoms were made of the thickeſt timber, and their ſides of wood and cork long ſoaked in water, with a layer of wet-ſand betwixt them. Their thickneſs was ſuch, that they were impenetrable to cannon-ſhot; and to prevent the effects of red-hot balls, a number of pipes were contrived to carry water through every part of the veſſel, and pumps ſufficient to fur-

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Mercier and Vignoles of the 39th regiment were ſitting. It took off major Burke's thigh; afterwards fell through the floor into the cellar: there it burſt, and forced the flooring with the unfortunate major up to the ceiling. When aſſiſtance came, they found him almoſt buried in the ruins of the room. He was inſtantly conveyed to the hoſpital, where he died ſoon after the wounded part had been amputated. Majors Mercier and Vignoles had time to eſcape before the ſhell burſt; nevertheleſs they were ſlightly wounded by the ſplinters, as were a ſerjeant and his daughter, who happened to be in the cellar when the ſhell entered.

The following are related as inſtances of very extraordinary eſcapes from the deſtructive power of theſe engines, and which indeed it ſeems difficult to account for.—A corporal had the muzzle of his firelock cloſed, and the barrel twiſted like a French horn, by a ſhell, without any injury to his perſon. A ſhell happened to fall into a tent where two ſoldiers were aſleep, without awaking them by its fall. A ſerjeant in an adjacent tent heard it, and ran near 40 yards to a place of ſafety, when he recollected the ſituation of his comrades. Thinking the ſhell had fallen blind, he returned and awakened them; both immediately roſe, but continued by the place, debating on the narrow eſcape they had had, when the ſhell exploded, and forced them with great violence againſt a garden wall, but, "miraculouſly" did no further miſchief than deſtroying every thing in the tent. On the new year's day of 1782, an officer of artillery obſerved a ſhell falling towards the place where he ſtood, and got behind a traverſe for protection. This he had ſcarcely done, when the ſhell fell into the traverſe, and inſtantly entangled him in the rubbiſh: one of the guard, named *Martin*, obſerving his diſtreſs, generouſly riſked his own life in defence of his officer, and ran to extricate him: but finding his own efforts ineffectual, called for aſſiſtance; when another of the guard joining him, they relieved the officer from his ſituation; and almoſt the ſame inſtant the ſhell burſt, and levelled the traverſe with the ground. Martin was afterwards promoted, and rewarded by the governor; who at the ſame time told him, that "he ſhould equally have noticed him for attending to his comrade." A ſhell happening to fall into the room where enſign Mackenzie of the 73d regiment was ſitting, carried away part of his chair, and fell into the room below, where it burſt, lifting him and the chair from the floor without further injury.

niſh a conſtant ſupply for the purpoſe. The people at the batteries were ſheltered from the bombs by a rope-netting made ſloping, that they might roll off, and ſpread with wet ſkins to prevent fire. Ten of theſe batteries were conſtructed out of the hulls of large veſſels, ſome of 50 or 60 guns, cut down for that purpoſe, and carrying from 10 to 28 guns each, with about half as many in reſerve in caſe of accidents. Each gun was ſerved by 36 artillery-men; and theſe floating batteries were to be ſeconded by 80 large boats carrying guns and mortars of heavy metal; a great number of ſhips of force and frigates, with ſome hundreds of ſmall craft, were to accompany them with troops, for the inſtant execution of what might be judged neceſſary. On this occaſion upwards of 1000 pieces of artillery and 80,000 barrels of gun-powder were provided. A body of 12,000 of the beſt troops of France were now added to the Spaniſh army before the place; the body of engineers was the beſt that both kingdoms could produce; and numbers of volunteers, of the beſt families in both, attended the ſiege. Numbers of military gentlemen alſo came from every part of Europe to be witneſſes of what paſſed at this celebrated ſiege, which was now compared to the moſt famous recorded in hiſtory. The conducting of it was committed to the duke de Crillon, who had diſtinguiſhed himſelf by the conqueſt of Minorca. Two princes of the blood royal of France, the count of Artois brother to the king, and the duke of Bourbon his couſin, came to be witneſſes of this extraordinary enterprize. Theſe behaved with the greateſt politeneſs both to the governor and garriſon. The count of Artois tranſmitted a packet of letters for various individuals in the garriſon, which had been intercepted and carried to Madrid, and which he requeſted that he might be the means of conveying to thoſe for whom they were deſigned. Both he and the duke of Bourbon ſignified to General Elliot the high regard they had for his perſon and character; and the duke de Crillon himſelf took this opportunity of expreſſing the ſame ſentiments, and to intreat him to accept of ſome refreſhments. General Elliot returned a polite anſwer, but accepted of the preſent with reluctance, and requeſted him for the future not to confer any favours of that kind upon him.

43
Prodigious armament brought before the fortreſs.

Such a prodigious armament raiſed the confidence of the beſiegers ſo high that they looked upon the conqueſt of the place as an abſolute certainty. They began to be impatient at the delays which aroſe in bringing matters to the utmoſt point of perfection; and the commander in chief was thought by far too modeſt, when he ſaid, that the garriſon might hold out for a fortnight. "It appeared (ſays Captain Drinkwater) that they meant, previous to their final efforts, to ſtrike if poſſible a terror through their opponents, by diſplaying an armament more powerful than had probably ever been brought before any fortreſs. Forty-ſeven ſail of the line, including three inferior two deckers; ten battering ſhips, deemed perfect in deſign, and eſteemed invincible, carrying 212 guns; innumerable frigates, xebeques, bomb-ketches cutters, gun and mortar boats, and ſmaller craft for diſembarking men, were aſſembled in the bay. On the land ſide were moſt ſtupendous and ſtrong batteries and works, mounting 200 pieces of heavy ordnance, and protected by an army of near 40,000 men, commanded by a victorious and active general, and animated by the immediate preſence of two princes of the blood royal of France, with other dignified perſonages, and many of their own nobility. In their certainty of ſucceſs, however, the enemy ſeemed entirely to have overlooked the nature of that force which was oppoſed to them; for though the garriſon ſcarcely conſiſted of more than 7000 effective men, including the marine brigade, they forgot that they were now veterans in this ſervice, had long been habituated to the effects of artillery, and were by degrees prepared for the arduous conflict that awaited them. We were at the ſame time commanded by officers of approved courage, prudence, and activity; eminent for all the accompliſhments of their profeſſion, and in whom we had unbounded confidence. Our ſpirits too were not a little elevated by the ſucceſs attending the firing of red-hot ſhot (c), which in this attack we hoped would enable us to bring our labours to a concluſion, and relieve us from the tedious cruelty of a vexatious blockade."

As a prelude to the dreadful ſtorm which was about to be poured forth on this devoted garriſon, the enemy, on the 9th of September 1782, opened a battery of 64 of their largeſt cannon, which was ſhortly accompanied with a terrible fire from other batteries, and a great number of mortars. On this and the following day an attack was made upon the batteries erected on Europa Point (ſo called from being the moſt ſoutherly point of the continent of Europe), which at that time were entirely under the management of captain Curtis of the Brilliant frigate, who had diſtinguiſhed himſelf during the ſiege, and now commanded a brigade of ſeamen by whom the batteries were ſerved. By theſe the fire of the Spaniards was ſo warmly returned, that they not only could make no impreſſion, but were forced to retire, after having received ſo much damage, that two of their principal ſhips were obliged to withdraw to the bay of Algeſiras, oppoſite to Gibraltar, in order to refit. On the 12th the enemy made preparations for the enſuing day, which was allotted for their grand and deciſive attack.

44
Deciſive attack on the 13th of September, 1782.

Accordingly, on the morning of the 13th, the ten floating batteries came forward, under the command of Don Buenventura de Moreno, a Spaniſh officer of great gallantry, and who had ſignalized himſelf at the taking of Minorca. Before ten o'clock they had all got into their proper ſtations, anchoring in a line about a thouſand yards diſtant from the ſhore. As ſoon as they were properly arranged, they began a heavy cannonade, and were ſeconded by all the cannon and mortars in the enemy's lines and approaches, at the ſame time that the garriſon opened all its batteries both with hot and cold ſhot from the guns, and ſhells from the howitzers and mortars. This terrible fire continued on both ſides without intermiſſion until noon; when that

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(c) This was ſuggeſted by lieutenant-governor Boyd, and had been attended with remarkable ſucceſs, September 8th, when the enemy's advanced works were almoſt deſtroyed by it.

45 Terrible deſtruction of the Spaniards.

that of the Spaniards began to ſlacken, and the fire of the garriſon to obtain a ſuperiority. About two o'clock the principal battering ſhip commanded by Don Moreno was obſerved to emit ſmoke as if on fire, and ſome men were ſeen buſy upon the roof ſearching from whence it proceeded. The fire from the garriſon was now kept up without the leaſt diſcontinuance or diminution, while that from the floating batteries was perceived ſenſibly to decreaſe; ſo that about ſeven in the evening they fired but few guns, and that only at intervals. At midnight the admiral's ſhip was plainly ſeen to burn, and an hour after was completely in flames. Eight more of theſe batteries took fire ſucceſſively; and on the ſignals of diſtreſs made by them, the multitude of feluccas, launches, and boats, with which they were ſurrounded, all came to their aſſiſtance, and began to take the men out of the burning veſſels. Captain Curtis, who lay ready with the gun-boats to take advantage of any favourable circumſtance, came upon them at two in the morning, and forming a line on the enemy's flank, advanced upon them with ſuch order and expedition as to throw them into immediate confuſion. At this ſudden and unexpected attack they were ſo aſtoniſhed and diſconcerted, that they fled precipitately with all their boats, totally abandoning their floating batteries to be burnt, and all who were in them to periſh in the flames. This would undoubtedly have been their fate, had not captain Curtis extricated them from the fire at the imminent danger of his own life and that of his men. In this work he was ſo eager, that while his boat was alongſide of one of the largeſt batteries, it blew up, and the fragments of the wreck ſpreading all around to a vaſt diſtance, ſome heavy pieces of timber fell into his boat and pierced through its bottom, killing one man and wounding ſeveral others. He eſcaped with difficulty out of this boat, which was ſunk, as well as another, by the ſame accident. The floating batteries were every one conſumed; and the violence with which they exploded was ſuch, that doors and windows at a great diſtance from ſhore were burſt open. About 400 people were ſaved from them; many of whom were picked up floating on rafts and pieces of timber. Indeed the blowing up of the batteries as the flames reached their powder rooms, and the diſcharge of the guns in ſucceſſion as the metal became heated by the fire, rendered any attempt to ſave them very dangerous.

46 Inactivity of the combined fleet.

This terrible cataſtrophe took place in ſight of the combined fleets of France and Spain. It had been propoſed that they ſhould co-operate upon this important occaſion, by attacking the garriſon at Europa Point, and ſuch places as appeared moſt expoſed to an attempt by ſea. This, it was afterwards ſaid, muſt have occaſioned a material diverſion of the garriſon's force, and, by dividing it, have weakened conſiderably the vigorous means of defence uſed in thoſe parts which were actually attacked. The reaſon aſſigned for this inactivity was the want of wind.

47 The blockade continued.

Though this terrible repulſe effectually convinced the Spaniards that Gibraltar could not be taken by force, ſome hope ſtill remained, that, without any further exertions on their part, the garriſon would be obliged to ſurrender from want of ammunition and proviſions. With this view they continued to blockade it cloſely, and to cut of all communication, flattering themſelves that Britain would not be able to collect a naval force ſufficient to drive their fleet from the bay before the fortreſs was reduced to extremity; and this, they imagined, muſt be the caſe in a few days. Such diligence, however, had been uſed on the part of the Britiſh, that a fleet was already aſſembled at Portſmouth, conſiſting of 35 ſail of the line, in excellent condition, and filled with the beſt officers and ſailors in Europe. The command was given to Lord Howe, who was accompanied in the expedition by admirals Barrington, Milbank, Hood, Sir Richard Hughes, and commodore Hotham, all of them men eminent in their profeſſion. At the ſame time alſo it fortunately happened, that a large Britiſh fleet of merchantmen had juſt arrived in ſafety from the Baltic; and that a Dutch ſquadron, which had been cruizing on their own coaſts, not being able to penetrate ſouthwards in order to join the French, had retired into port, and given up the intention of effecting any junction for that ſeaſon.

At this time the Britiſh nation was in the utmoſt anxiety about the fate of Gibraltar. The progreſs of the ſhips was delayed by contrary winds, and it was not until they had gained the ſouthern coaſt of Portugal that they received information of the defeat of the enemy's attempt on the 13th of September. On the 11th of October Lord Howe entered the Straits; and ſeveral of the ſtoreſhips deſtined for Gibraltar came ſafe to anchor under the cannon of the fort without any moleſtation from the enemy. The combined fleet in the mean time had been much damaged by a ſtorm; two ſhips of the line were driven aſhore near Algeſiras; two more were driven out of the bay into the Mediterranean; others loſt their maſts, and moſt of them ſuffered conſiderably. One in particular, a ſhip of 70 guns, was carried by the ſtorm acroſs the bay, and ran aground under the works of Gibraltar, where ſhe was taken by the garriſon, with her whole complement of men, conſiſting of 700. Notwithſtanding the endeavours of the enemy to deſtroy her, ſhe was ſafely got off, and properly repaired. The combined fleet, however, put to ſea on the 13th, with a view to prevent the remaining ſtoreſhips that had overſhot the bay to the eaſt, from making good their entrance into it; and at the ſame time to rejoin the two ſhips that had been ſeparated from the main body by the ſtorms. Having the advantage of the wind, they bore down upon the Britiſh fleet, which drew up in order of battle to receive them; but notwithſtanding their ſuperiority, they declined coming to an engagement. On the wind becoming more favourable next day, Lord Howe took the opportunity to bring in the ſtoreſhips that were in company; and the day following the remainder were conveyed to Gibraltar, the troops for the reinforcement of the garriſon were landed, with a large ſupply of powder and ample proviſion in every other reſpect. As they returned through the ſtraights they were threatened with an engagement by the combined fleets; but though the latter had a ſuperiority of 12 ſhips of the line, they kept at a wary diſtance. Some firing indeed took place, but it was attended with little effect on either ſide.

48 The garriſon finally relieved.

This laſt relief proved entirely deciſive; for though the blockade continued till news arrived of the preliminaries of peace being ſigned, in the beginning of February 1783, no other attack was made. The news of the pacification were received with the utmoſt joy by the Spaniards. Mutual civilities paſſed between the commanders in chief, and the Duke de Crillon paid many handſome compliments to the governor and garriſon for their noble defence; declaring that he had exerted himſelf to the utmoſt of his abilities, and though he had not proved ſucceſsful, yet he was happy in having his ſovereign's approbation of his conduct.

The poſſeſſion of Gibraltar is eſteemed of very great conſequence to Britain. It not only gives her the command of the Straits, and their navigation; but affords refreſhment and accommodation to her fleets in time of war, and to her merchantmen at all times; which, to a maritime power, is of very great advantage. From its ſituation, it divides both the kingdoms of France and Spain; that is, it hinders a ready communication by ſea between the different parts of theſe kingdoms. This, of courſe, hinders the conjunction of the fleets and ſquadrons with each other, or at leaſt renders it ſo difficult as to be a perpetual check upon theſe ambitious powers. It awes alſo the piratical ſtates of Barbary, and in like manner the emperor of Morocco; inſomuch, that the Britiſh commerce is more ſafe than that of any other European power, which gives it great advantages in point of freight. It is otherwiſe highly favourable to its trade in the Mediterranean and Levant. It procures Britain the reſpect of the Italian and other powers; who, though far diſtant from her, muſt conſider this as an inſtance of her power to hurt or aſſiſt them. It alſo ſaves her the expence of ſquadrons and convoys, upon any diſputes or diſturbances that may happen among theſe powers, and which would otherwiſe be neceſſary for the protection of her navigation.

GIBSON (RICHARD), an Engliſh painter, commonly called the *Dwarf*, was originally page to a lady at Mortlake; who, obſerving that his genius led him to painting, had the generoſity to get him inſtructed in the rudiments of that art. He devoted himſelf to Sir Peter Lely's manner, and copied his pictures to admiration, eſpecially his portraits: his paintings in water-colours were alſo eſteemed. He was in great favour with Charles I. who made him his page of the back-ſtairs; and he had the honour to inſtruct in drawing queen Mary and queen Anne when they were princeſſes. He married one Mrs Anne Shepherd, who was alſo a dwarf; on which occaſion king Charles I. honoured their marriage with his preſence, and gave away the bride. Mr Waller wrote a poem on this occaſion, intitled “The marriage of the Dwarfs; in which are theſe lines:

“ Deſign or chance makes others wive,
“ But nature did this match contrive,
“ Eve might as well have Adam fled,
“ As ſhe deny'd her little bed
“ To him, for whom heav'n ſeem'd to frame
“ And meaſure out this only dame.”

Mr Fenton, in his notes on this poem, obſerves that he had ſeen this couple painted by Sir Peter Lely; and that they were of an equal ſtature, each being three feet ten inches high. However, they had nine children, five of whom arrived at maturity; theſe well proportioned, and of the uſual ſtandard of mankind. But what nature denied this couple in ſtature, ſhe gave them in length of days: for Mr Gibſon died in the 75th year of his age; and his wife, having ſurvived him almoſt 20 years, died in 1709, aged 89.

GIBSON (Dr Edmund), biſhop of London, was born in Weſtmoreland, in 1669. He applied himſelf early and vigorouſly to learning, and diſplayed his knowledge in ſeveral writings and tranſlations, which recommended him to the patronage of archbiſhop Tenniſon. He was appointed domeſtic chaplain to his Grace; and we ſoon after find him rector of Lambeth, and archdeacon of Surry. Becoming thus a member of the convocation, he engaged in a controverſy, which was carried on with great warmth by the members of both houſes, and defended his patron's rights, as preſident, in eleven pamphlets; he then formed and completed his more comprehenſive ſcheme of the legal duties and rights of the Engliſh clergy, which was at length publiſhed under the title of *Codex Juris Eccleſiaſtici Anglicani*, in folio. Archbiſhop Tenniſon dying in 1715, and Dr Wake biſhop of Lincoln being made archbiſhop of Canterbury, Dr Gibſon ſucceeded the latter in the ſee of Lincoln, and in 1720 was promoted to the biſhopric of London. He now not only governed his dioceſe with the moſt exact regularity, but by his great care promoted the ſpiritual affairs of the church of England colonies in the Weſt Indies. He was extremely jealous of the leaſt of the privileges belonging to the church; and therefore, though he approved of the toleration of the Proteſtant Diſſenters, he continually guarded againſt all the attempts made to procure a repeal of the corporation and teſt acts; in particular, his oppoſition to thoſe licentious aſſemblies called *maſquerades*, gave great umbrage at court, and effectually excluded him from all further favours. He ſpent the latter part of his life in writing and printing paſtoral letters, viſitation-charges, occaſional ſermons, and tracts againſt the prevailing immoralities of the age. His paſtoral letters are juſtly eſteemed as the moſt maſterly productions againſt infidelity and enthuſiaſm. His moſt celebrated work, the *Codex*, has been already mentioned. His other publications are, 1. An edition of Drummond's *Polemo-Middinia*, and James V. of Scotland's *Cantilena Ruſtica*, with notes. 2. The *Chronicon Saxonicum*, with a Latin tranſlation, and notes. 3. *Reliquiæ Spelmannianæ*, the poſthumous works of Sir Henry Spelman, relating to the laws and antiquities of England. 4. An edition of *Quintilian de Arte Oratoria*, with notes. 5. An Engliſh tranſlation of Cambden's *Britannia*, with additions, two volumes folio: and, 6. A number of ſmall pieces, that have been collected together and printed in three volumes folio.—His intenſe application to ſtudy impaired his health; notwithſtanding which, he attained the age of 79. He expired in September 1748, after an epiſcopate of near 33 years. With regard to biſhop Gibſon's private life and character, he was in every reſpect a perfect economiſt. His abilities were ſo well adapted to diſcharge the duties of his ſacred function, that, during the incapacity of archbiſhop Wake, the tranſaction of eccleſiaſtical affairs was committed to the biſhop of London. He was a true friend to the eſtabliſhed church and government, and as great an enemy to perſecution. He was uſually conſulted by the moſt learned and exalted perſonages in church and ſtate, and the greateſt deference was paid to his judgment. He poſſeſſed the ſocial virtues in an eminent degree; his beneficence was very extenſive; and had ſuch generoſity, that he freely gave two thouſand five hundred pounds, left him by Dr Crow, who was once his chaplain, to Crow's own relations, who were very poor.

GIDEON the ſon of Joaſh, of the tribe of Manaſſeh. He dwelt in the city of Ophrah: and had a very extraordinary call to deliver the Iſraelites from the oppreſſion of the Midianites, to which they had become ſubject after the death of Barak and Deborah. Having effected their deliverance by ſupernatural aid, he was choſen judge of Iſrael in the year of the world 2759, and died in 2768. (See Judges, Chap. vi, vii, & viii.

GIFT, *Donum,* in law, is a conveyance which paſſeth either lands or goods; and is of a larger extent than a grant, being applied to things moveable and immoveable; yet as to things immoveable, when taken ſtrictly, it is applicable only to lands and tenements given in tail; but *gift* and *grant* are too often confounded.

New-Year's GIFTS, preſents made on new-year's day, as a token of the giver's good-will, as well as by way of preſage of a happy year.

This practice is very ancient, the origin of it among the Romans being referred to Tatius king of the Sabines, who reigned at Rome conjointly with Romulus, and who having conſidered as a good omen a preſent of ſome ſprings of vervain gathered in a wood conſecrated to Strenia the goddeſs of ſtrength, which he received on the firſt day of the new year, authoriſed this cuſtom afterwards, and gave to theſe preſents the name of Strenæ. However this may be, the Romans on that day celebrated a feſtival in honour of Janus, and paid their reſpects at the ſame time to Juno; but they did not paſs it in idleneſs, leſt they ſhould become indolent during the reſt of the year. They ſent preſents to one another of figs, dates, honey, &c. to ſhow their friends that they wiſhed them a happy and agreeable life. Clients, that is to ſay thoſe who were under the protection of the great, carried preſents of this kind to their patrons, adding to them a ſmall piece of ſilver. Under Auguſtus, the ſenate, the knights, and the people, preſented ſuch gifts to him, and in his abſence depoſited them in the Capitol. Of the ſucceeding princes ſome adopted this cuſtom, and others aboliſhed it, but it always continued among the people. The early Chriſtians condemned it, becauſe it appeared to be a relique of Paganiſm, and a ſpecies of ſuperſtition; but when it began to have no other object than that of being a mark of veneration and eſteem, the church ceaſed to diſapprove of it.

GIGG, GIGA, or JIG, in muſic and dancing, a gay, briſk, ſprightly compoſition, and yet in full meaſure, as well as the allemand, which is more ſerious. Menage takes the word to ariſe from the Italian *giga,* a muſical inſtrument mentioned by Dante. Others ſuppoſe it to be derived from the Teutonic *gieg,* or *ghiighe,* "a fiddle." This is a favourite air in moſt nations of Europe: its characteriſtic is duple time, marked $\frac{6}{8}$, or $\frac{12}{8}$: it conſiſts of two ſtrains, without any determinate number of bars.

GIGGLEWICK, a town in the Weſt Riding of Yorkſhire, half a mile from Settle, ſtands on the river Ribble; where, at the foot of a mountain is a ſpring, the moſt noted in England for ebbing and flowing ſometimes thrice in an hour, and the water ſubſides three quarters of a yard at the reflux, though the ſea is 30 miles off. At this town is an eminent free grammar ſchool; and in the neighbourhood are dug up flags, ſlate, and ſtone, with a good lime-kiln.

GILAN, or GHILAN, a conſiderable province of Aſia in Perſia, lying on the ſide of the Caſpian ſea, and to the S. W. of it. It is ſuppoſed to be the Hyrcania of the ancients. It is very agreeably ſituated, having the ſea on one ſide and high mountains on the other; and there is no entering it but through narrow paſſes, which may be eaſily defended. The ſides of the mountains are covered with many ſorts of fruit-trees, and in the higheſt parts of them there are deer, bears, wolves, leopards, and tygers; which laſt the Perſians have a method of taming, and hunt with them as we do with dogs. Gilan is one of the moſt fruitful provinces of all Perſia; and produces abundance of ſilk, oil, wine, rice, and tobacco, beſides excellent fruits. The inhabitants are brave, and of a better complexion than the other Indians, and the women are accounted extremely handſome. Reſht is the capital town.

GIHON, (anc. geog.) one of the rivers of Paradiſe; according to Wells, the eaſtern branch of the Euphrates, into which it divides after its conjunction with the Tigris.

GILBERT, or GILBERD, (William), a Phyſician, was born at Colcheſter in the year 1540, the eldeſt ſon of the recorder of that borough. Having ſpent ſome time in both univerſities, he went abroad; and at his return ſettled in London where he practiſed with conſiderable reputation. He became a member of the college of phyſicians, and phyſician in ordinary to Queen Elizabeth, who, we are told, gave him a penſion to encourage him in his ſtudies. From his epitaph it appears that he was alſo phyſician to King James I. He died in the year 1603, aged 63; and was buried in Trinity-church in Colcheſter, where a handſome monument was erected to his memory. His books, globes, inſtruments, and foſſils, he bequeathed to the college of phyſicians, and his picture to the ſchool-gallery at Oxford. He wrote, 1. *De magnete, magneticeſque corporibus, et de magno magnete tellure, phyſiologia nova;* London 1600, folio. 2. *De mundo noſtro ſublunari, philoſophia nova;* Amſterdam 1651, 4to. He was alſo the inventor of two mathematical inſtruments for finding the latitude at ſea without the help of ſun, moon, or ſtars. A deſcription of theſe inſtruments was afterwards publiſhed by Thomas Blondeville in his *Theoriques of the planets.*

GILBERT (Sir Humphrey), a brave officer and ſkilful navigator, was born about the year 1539, in Devonſhire, of an ancient and honourable family. Though a ſecond ſon, he inherited a conſiderable fortune from his father. He was educated at Eaton, and afterwards at Oxford; where probably he did not continue long, as he hath eſcaped the induſtrious Anthony Wood. It ſeems he was intended to finiſh his ſtudies in the Temple; but being introduced at court by his aunt Mrs Catherine Aſhley, then in the queen's ſervice, he was diverted from the ſtudy of the law, and commenced ſoldier. Having diſtinguiſhed himſelf in ſeveral military expeditions, particularly that to Newhaven in 1563, he was ſent over to Ireland to aſſiſt in ſuppreſſing a rebellion; where, for his ſignal ſervices, he was made commander in chief and governor of Munſter, and knighted by the lord deputy, Sir Henry Sidney, on the firſt day of the year 1570. He returned ſoon after to England, where he married a rich heireſs. Nevertheleſs, in 1572, he ſailed with a ſquadron of nine ſhips to reinforce Colonel Morgan, who at that time meditated the recovery of Fluſhing. Probably on his return to England he reſumed his coſmographical ſtudies, to which he was naturally inclined: for, in the year 1576, he publiſhed his book on the north-weſt paſſage to the Eaſt Indies; and as Martin Forbiſher ſailed the ſame year, probably it was in conſequence of this treatiſe. In 1578, he obtained from the queen a very ample patent, empowering him to diſcover and poſſeſs in North America any lands then unſettled. He ſailed to Newfoundland, but ſoon returned to England without ſucceſs: nevertheleſs, in 1583, he embarked a ſecond time with five ſhips, the largeſt of which put back on account of a contagious diſtemper on board. Our general landed on Newfoundland on the third of Auguſt, and on the fifth took poſſeſſion of the harbour of St John's. By virtue of his patent, he granted leaſes to ſeveral people; but though none of them remained there at that time, they ſettled afterwards in conſequence of theſe leaſes: ſo that Sir Humphrey deſerves to be remembered as the real founder of the vaſt American empire. On the 20th of Auguſt he put to ſea again, on board a ſmall ſloop; which on the 29th foundered in a hard gale of wind. Thus periſhed Sir Humphry Gilbert; a man of quick parts, a brave ſoldier, a good mathematician, a ſkilful navigator, and of a very enterpriſing genius. We learn alſo, that he was remarkable for his eloquence, being much admired for his patriotic ſpeeches both in the Engliſh and Iriſh parliaments. He wrote "A diſcourſe to prove a paſſage by the north-weſt to Cathaia and the Eaſt Indies, printed Lond. 1576." This treatiſe, which is a maſterly performance, is preſerved in Hakluyt's collection of voyages, vol. iii. p. 11. The ſtyle is ſuperior to moſt, if not to all, the writers of that age; and ſhows the author to have been a man of conſiderable reading. He mentions, at the cloſe of this work, another treatiſe on navigation, which he intended to publiſh: it is probably loſt.

GILBERTINES, an order of religious, thus called from St Gilbert of Sempringham, in the county of Lincoln, who founded the ſame about the year 1148: the monks of which obſerved the rule of St Auguſtine; and were accounted canons: and the nuns that of St Benedict.

The founder of this order erected a double monaſtery, or rather two different ones, contiguous to each other, the one for men, the other for women, but parted by a very high wall.

St Gilbert himſelf founded 13 monaſteries of this order, viz. four for men alone, and nine for men and women together, which had in them 700 brethren and 1500 ſiſters. At the diſſolution there were about 25 houſes of this order in England and Wales.

GILBOA, (anc. geog.), mountains of Samaria, ſtretching out from weſt to eaſt, on the confines of the half tribe of Manaſſeh, and of the tribe of Iſſachar; and to the ſouth part of the valley of Jezreel, beginning weſtward at the city of Jezreel, ſituated at the foot of theſe mountains, reaching almoſt quite to the Jordan, lying at the diſtance of ſix miles from Scythopolis. Famous for the death of Saul and his ſon Jonathan, and the defeat of the Iſraelites by the Philiſtines.

GILCHRIST (Dr Ebenezer), an eminent Scots phyſician, was born at Dumfries in 1707. He began the ſtudy of medicine at Edinburgh, which he afterwards proſecuted at London and Paris. He obtained the degree of doctor of medicine from the univerſity of Rheims; and in the year 1732 he returned to the place of his nativity, where he afterwards conſtantly reſided, and continued the practice of medicine till his death. It may with juſtice be ſaid, that few phyſicians of the preſent century have exerciſed their profeſſion in a manner more reſpectable or ſucceſsful than Dr Gilchriſt; and few have contributed more to the improvement of the healing art. Having engaged in buſineſs in an early period of life, his attention was wholly devoted to obſervation. Endowed by nature with a judgment acute and ſolid, with a genius active and inventive, he ſoon diſtinguiſhed himſelf by departing, in various important particulars, from eſtabliſhed but unſucceſsful modes of practice. Several of the improvements which he introduced have procured him great and deſerved reputation, both at home and abroad. His practice, in ordinary caſes, was allowed to be judicious, and placed him high in the confidence and eſteem of the inhabitants of that part of the country where he lived. But his uſefulneſs was not confined to his own neighbourhood. On many occaſions he was conſulted by letter from the moſt diſtant parts of the country. In different collections are to be found ſeveral of his performances, which prove that he had ſomething new and uſeful to offer upon every ſubject to which he applied himſelf. But thoſe writings which do him the greateſt honour, are two long diſſertations on Nervous Fevers, in the Medical Eſſays and Obſervations publiſhed by a Society in Edinburgh; and a treatiſe on the uſe of Sea-voyages in medicine, which firſt made its appearance in the year 1757, and was afterwards reprinted in 1771. By means of the former, the attention of phyſicians was firſt turned to a ſpecies of fever which is now found to prevail univerſally in Scotland; and the liberal uſe of wine, which he was the firſt among the moderns to recommend, has ſince been adopted in theſe fevers by the moſt judicious phyſicians of the preſent age, and has probably contributed not a little to the ſucceſs of their practice. His treatiſe on Sea-voyages points out in a manner ſo clear, and ſo much on the ſure footing of experience, their utility in various diſtempers, particularly in conſumptions, that there is now a proſpect of our being able to employ a remedy in this untractable diſeaſe much more efficacious than any hitherto in uſe. Dr Gilchriſt died in 1774.

GILD, or Guild. See Guild.

GILDAS (furnamed *the Wiſe*), was born in Wales in the year 511. Where he was educated is uncertain; but it appears from his own writings that he was a monk. Some writers ſay that he went over to Ireland; others, that he viſited France and Italy. They agree however in aſſerting, that after his return to

England he became a celebrated and moſt aſſiduous preacher of the goſpel. Du Pin ſays he founded a monaſtery at Venetia in Britain. Gildas is the only Britiſh author of the ſixth century whoſe works are printed; they are therefore valuable on account of their antiquity, and as containing the only information we have concerning the times of which he wrote. His Hiſtory of Britain is, however, a very flimſy performance, and his ſtyle obſcure and inelegant.

1 Gilding when firſt introduced at Rome.

GILDING, the art of ſpreading or covering a thing over with gold, either in leaf or liquid. The art of gilding was not unknown among the ancients, though it never arrived among them at the perfection to which the moderns have carried it. Pliny aſſures us, that the firſt gilding ſeen at Rome was after the deſtruction of Carthage, under the cenſorſhip of Lucius Mummius, when they began to gild the ceilings of their temples and palaces; the Capitol being the firſt place on which this enrichment was beſtowed. But he adds, that luxury advanced on them ſo haſtily, that in a little time you might ſee all, even private and poor perſons, gild the very walls, vaults, &c. of the houſes.

We need not doubt but they had the ſame method with us, of beating gold, and reducing it into leaves; though it ſhould ſeem they did not carry it to the ſame height, if it be true which Pliny relates, that they only made 750 leaves of four fingers ſquare out of a whole ounce. Indeed he adds, that they could make more; that the thickeſt were called *bracteæ Præneſtinæ*, by reaſon of a ſtatue of the goddeſs Fortune at Præneſte gilt with ſuch leaves; and that the thinner ſort were called *bracteæ queſtoriæ*.

2 Ancient Gilding inferior to the modern.

The modern gilders do alſo make uſe of gold-leaves of divers thickneſſes; but there are ſome ſo fine, that a thouſand do not weigh above four or five drachms. The thickeſt are uſed for gilding on iron and other metals; and the thinneſt on wood. But we have another advantage over the ancients in the manner of uſing or applying the gold; the ſecret of painting in oil, diſcovered of late ages, furniſhes us with means of gilding works that ſhall endure all the injuries of time and weather, which to the ancients was impracticable. They had no way to lay the gold on bodies that would not endure the fire but with whites of eggs or ſize, neither of which will endure the water; ſo that they could only gild ſuch places as were ſheltered from the moiſture of the weather.

The Greeks called the compoſition on which they applied their gilding on wood *leucophæum* or *leucophorum*; which is deſcribed as a ſort of glutinous compound earth, ſerving in all probability to make the gold ſtick and bear poliſhing. But the particulars of this earth, its colour, ingredients, &c. the antiquaries and naturaliſts are not agreed upon.

The luſtre and beauty of gold have occaſioned ſeveral inquiries and diſcoveries concerning the different methods of applying it to different ſubſtances. Hence the art of gilding is very extenſive, and contains many particular operations and various management.

3 Falſe gilding with laquer or Dutch-leaf.

A colour of gold is given by painting and by varniſhes, without employing gold; but this is a falſe kind of gilding. Thus a very fine golden colour is given to braſs and to ſilver, by applying upon theſe metals a gold-coloured varniſh, which, being tranſparent, ſhows all the brilliancy of the metals beneath. Many ornaments of braſs are varniſhed in this manner, which is called *gold laquering*, to diſtinguiſh them from thoſe which are really gilt. Silver-leaves thus varniſhed are put upon leather, which is then called *gilt leather*. See Laquer.

Amongſt the falſe gilding may alſo be reckoned thoſe which are made with thin leaves of copper or braſs, called *Dutch leaf*. In this manner are made all the kinds of what is called *gilt paper*.

In the true guilding, gold is applied to the ſurface of bodies. The gold intended for this purpoſe ought in general to be beat into thin leaves, or otherwiſe divided into very fine parts.

4 Gilding with ſize.

As metals cannot adhere well merely by contact to any but to other metallic ſubſtances, when gold is to be applied to the ſurface of ſome unmetallic body, that ſurface muſt be previouſly covered with ſome gluey and tenacious ſubſtance, by which the gold ſhall be made to adhere. Theſe ſubſtances are in general called *ſizes*. Some of theſe are made of vegetable and animal glues, and others of oily, gluey, and drying matters. Upon them the leaves of gold are applied, and preſſed down with a little cotton or a hare's foot; and when the whole is dry, the work is to be finiſhed and poliſhed with a hard inſtrument, called a *dog's tooth*, to give luſtre.

5 With oil.

When the work is required to be capable of reſiſting rain or moiſture, it ought to be previouſly covered with a compoſition of drying oil and yellow ochre ground together; otherwiſe a water-ſize may be uſed, which is prepared by boiling cuttings of parchment or white leather in water, and by mixing with this ſome chalk or whiting: ſeveral layers of this ſize muſt be laid upon the wood, and over theſe a layer of the ſame ſize mixed with yellow ochre. Laſtly, another mixture, called *gold ſize*, is to be applied above theſe; upon which the gold-leaves are to be fixed. This gold ſize, the uſe of which is to make the gold-leaf capable of being burniſhed, is compoſed of tobacco-pipe clay, ground with ſome ruddle or black lead, and tempered with a little tallow or oil of olives. The edges of glaſſes may be guilt by applying firſt a very thin coat of varniſh, upon which the gold-leaf is to be fixed; and when the varniſh is hardened, may be burniſhed. This varniſh is prepared by boiling powdered amber with linſeed oil in a braſs veſſel to which a valve is fitted, and by diluting the above ſolution with four or five times its quantity of oil of turpentine; and that it may dry ſooner, it may be ground with ſome white lead.

6 Of gilding metals.

The method of applying gold upon metals is entirely different. The ſurface of the metal to be gilt is firſt to be cleaned; and then leaves are to be applied to it, which, by means of rubbing with a poliſhed bloodſtone, and a certain degree of heat, are made to adhere perfectly well. In this manner ſilver-leaf is fixed and burniſhed upon braſs in the making of what is called *French plate*, and ſometimes alſo gold-leaf is burniſhed upon copper and upon iron.

Gold is applied to metals in ſeveral other manners. One of theſe is by previouſly forming the gold into a paſte or amalgam with mercury. In order to obtain a ſmall amalgam of gold and mercury, the gold is firſt to be reduced into thin plates or grains, which are heated red-hot, and thrown into mercury previouſly heated, till it begins to ſmoke. Upon ſtirring the mercury with an iron rod, the gold totally diſappears. The proportion of mercury to gold is generally as ſix or eight to one.

With this amalgam the ſurface of the metal to be gilded is to be covered; then a ſufficient heat is to be applied to evaporate the mercury: and the gold is laſtly to be burniſhed with a blood-ſtone.

7 Uſes of the nitrous acid in gilding.

This method of gilding by amalgamation is chiefly uſed for gilding copper, or an allay of copper, with a ſmall portion of zinc, which more readily receives the amalgam; and is alſo preferable for its colour, which more reſembles that of gold than the colour of copper. When the metal to be gilt is wrought or chaſed, it ought to be previouſly covered with quickſilver before the amalgam is applied, that this may be eaſier ſpread: but when the ſurface of the metal is plain, the amalgam may be applied directly to it. The quickſilver or amalgam is made to adhere to the metal by means of a little aquafortis, which is rubbed on the metallic ſurface at the ſame time, by which this ſurface is cleanſed from any ruſt or tarniſh which might prevent the union or adheſion of the metals. But the uſe of the nitrous acid in this operation is not, as is generally ſuppoſed, confined merely to cleanſe the ſurface of the metal to be gilt from any ruſt or tarniſh it may have acquired; but it alſo greatly facilitates the application of the amalgam to the ſurface of that metal, probably in the following manner: It firſt diſſolves part of the mercury of the amalgam: and when this ſolution is applied to the copper, this latter metal having a ſtronger diſpoſition to unite with the nitrous acid than the mercury has, precipitates the mercury upon its ſurface, in the ſame manner as a poliſhed piece of iron precipitates upon its ſurface copper from a ſolution of blue vitriol. When the metal to be gilt is thus covered over with a thin precipitated coat of mercury, it readily receives the amalgam. In this ſolution and precipitation of mercury, the principal uſe of the nitrous acid in the proceſs of gilding appears to conſiſt. The amalgam being equally ſpread over the ſurface of the metal to be gilt by means of a bruſh, the mercury is then to be evaporated by a heat juſt ſufficient for that purpoſe; for if it be too great, part of the gold may alſo be expelled, and part of it will run together, and leave ſome of the ſurface of the metal bare: while the mercury is evaporating, the piece is to be from time to time taken from the fire, that it may be examined, that the amalgam may be ſpread more equally by means of a bruſh, that any defective parts of it may be again covered, and that the heat may not be too ſuddenly applied to it: when the mercury is evaporated, which is known by the ſurface being entirely become of a dull yellow colour, the metal muſt then undergo other operations, by which the fine gold colour is given to it. Firſt, the gilded piece of metal is rubbed with a ſcratch bruſh (which is a bruſh compoſed of braſs wire) till its ſurface is made ſmooth; then it is covered over with a compoſition called *gilding-wax*, and is again expoſed to the fire till the wax be burnt off. This wax is compoſed of bees-wax, ſometimes mixed with ſome of the following ſubſtances; red ochre, verdegriſe, copper-ſcales, alum, vitriols, borax: but according to Dr Lewis, the ſaline ſubſtances alone are ſufficient, without any wax. By this operation the colour of the gilding is heightened; and this effect ſeems to be produced by a perfect diſſipation of ſome mercury remaining after the former operation. This diſſipation is well effected by this equable application of heat. The gilt ſurface is then covered over with a ſaline compoſition, conſiſting of nitre, alum, or other vitriolic ſalt, ground together, and mixed up into a paſte with water or urine. The piece of metal thus covered is expoſed to a certain degree of heat, and then quenched in water. By this method its colour is further improved, and brought nearer to that of gold. This effect ſeems to be produced by the acid of nitre (which is diſengaged by the vitriolic acid of the alum or other vitriolic ſalt during the expoſure to heat) acting upon any particles of copper which may happen to lie on the gilded ſurface. Laſtly, ſome artiſts think that they give an additional luſtre to their gilt work by dipping it into a liquor prepared by boiling ſome yellow materials, as ſulphur, orpiment, or turmeric. The only advantage of this operation is, that a part of the yellow matter, as the ſulphur or turmeric, remains in ſome of the hollows of the carved work, in which the gilding is apt to be more imperfect, and to which it gives a rich and ſolid appearance.

Iron cannot be gilt by amalgamation, unleſs, as it is ſaid, it be previouſly coated with copper by dipping it into a ſolution of blue vitriol. Iron may alſo receive a golden coat from a ſaturated ſolution of gold in aqua-regia, mixed with ſpirit of wine, the iron having a greater affinity with the acid, from which it therefore precipitates the gold. Whether any of theſe two methods be applicable to uſe, is uncertain: but the method commonly employed of fixing gold upon iron is that abovementioned, of burniſhing gold-leaf upon this metal when heated ſo as to become blue; and the operation will be more perfect if the ſurface has been previouſly ſcratched or graved.

Another method is mentioned by authors of gilding upon metals, and alſo upon earthen ware, and upon glaſs; which is, to fuſe gold with regulus of antimony, to pulveriſe the maſs which is ſufficiently brittle to admit that operation, to ſpread this powder upon the piece to be gilt, and expoſe it to ſuch a fire that the regulus may be evaporated, while the gold remains fixed. The inconveniences of this method, according to Dr Lewis, are, that the powder does not adhere to the piece, and cannot be equally ſpread; that part of the gold is diſſipated along with the regulus; that glaſs is fuſible with the heat neceſſary for the evaporation of regulus of antimony; and that copper is liable to be corroded by the regulus, and to have its ſurface rendered uneven.

8 Improvements by Dr Lewis.

Phil. Com. of Arts.

On the ſubject of gilding by amalgamation Dr Lewis has the following remarks. "There are two principal inconveniences in this buſineſs: One, that the workmen are expoſed to the fumes of the mercury, and generally, ſooner or latter, have their health greatly impaired by them: the other, the loſs of the mercury; for tho' part of it is ſaid to be detained in cavities made in the chimney for that purpoſe, yet the greateſt part of it is loſt. From ſome trials I have made, it appeared that both theſe inconveniences, particularly the firſt and moſt conſiderable one, might in a good meaſure be avoided, by means of a furnace of a due conſtruction. If the communication of a furnace with its chimney, inſtead

ſtead of being over the fire, is made under the grate, the aſh-pit door, or other apertures beneath the grate, cloſed, and the mouth of the furnace left open; the current of air, which otherwiſe would have entered beneath, enters now at the top, and, paſſing down thro' the grate to the chimney, carries with it completely both the vapour of the fuel and the fumes of ſuch matters as are placed upon it: the back part of the furnace ſhould be raiſed a little higher above the fire than the fore part, and an iron plate laid over it, that the air may enter only at the front, where the workman ſtands who will be thus effectually ſecured from the fumes, and from being incommoded by the heat, and at the ſame time have full liberty of introducing, inſpecting, and removing the work. If ſuch a furnace is made of ſtrong forged (not milled) iron plate, it will be ſufficiently durable: the upper end of the chimney may reach above a foot and a half higher than the level of the fire: over this is to be placed a larger tube, leaving an interval of an inch or more all round between it and the chimney, and reaching to the height of 10 or 12 feet, the higher the better. The external air, paſſing up between the chimney and the outer pipe, prevents the latter from being much heated, ſo that the mercurial fumes will condenſe againſt its ſides into running quickſilver, which, falling down to the bottom, is there catched in a hollow rim, formed by turning inwards a portion of the lower part, and conveyed, by a pipe at one ſide, into a proper receiver.

9 **M du Fay's method of raiſing gold figures.**

“ Mr Hellot communicates, in the Memoirs of the French Academy for the year 1745, a method of making raiſed figures of gold on works of gold or ſilver, found among the papers of M. du Fay, and of which M. du Fay himſelf had ſeen ſeveral trials. Fine gold in powder, ſuch as reſults from the parting of gold and ſilver by aquafortis, is directed to be laid in a heap on a levigating ſtone, a cavity made in the middle of the heap, and half its weight of pure mercury put into the cavity; ſome of the fetid ſpirit obtained from garlic root by diſtillation in a retort, is then to be added, and the whole immediately mingled and ground with a muller till the mixture is reduced into an uniform grey powder. The powder is to be ground with lemon juice to the conſiſtence of paint, and applied on the piece previouſly well cleaned and rubbed over with the ſame acid juice: the figures drawn with it may be raiſed to any degree by repeating the application. The piece is expoſed to a gentle fire till the mercury is evaporated ſo as to leave the gold yellow, which is then to be preſſed down, and rubbed with the finger and a little ſand, which makes it appear ſolid and brilliant: after this it may be cut and embelliſhed. The author obſerves, that being of a ſpongy texture, it is more adviſable to cut it with a chiſſel than to raiſe it with a graver; that it has an imperfection of being always pale; and that it would be a deſirable thing to find means of giving it colour, as by this method ornaments might be made of exquiſite beauty and with great facility. As the paleneſs appears to proceed from a part of the mercury retained by the gold, I apprehend it might be remedied by the prudent application of a little warm aquafortis, which, diſſolving the mercury from the exterior part, would give at leaſt a ſuperficial high colour: if the piece is ſilver, it muſt be defended from the aquafortis by covering it with wax. Inſtruments or ornaments of gold, ſtained by mercury, where the gold is connected with ſubſtances incapable of bearing fire, may be reſtored to their colour by the ſame means.

10 **Another method.**

“ The foregoing proceſs is given entirely on the authority of the French writer. I have had no experience of it myſelf, but have ſeen very elegant figures of gold raiſed upon ſilver, on the ſame principle, by a different procedure. Some cinnibar was ground, not with the diſtilled ſpirit, but with the expreſſed juice of garlic, a fluid remarkably tenaceous. This mixture was ſpread all over the poliſhed ſilver; and when the firſt layer was dry, a ſecond, and after this a third, was applied. Over theſe were ſpread as many layers of another mixture, compoſed chiefly of aſphaltum and linſeed oil boiled down to a due conſiſtence. The whole being dried with a gentle heat on a kind of wire-grate, the figures were traced and cut down to the ſilver, ſo as to make its ſurface rough: the inciſions were filled with an amalgam of gold, raiſed to different heights in different parts according to the nature of the deſign; after which a gentle fire, at the ſame time that it evaporated the mercury, deſtroyed the tenacity of the gummy juice, ſo that the coating, which ſerved to confine the amalgam, and as a guide in the application of it, was now eaſily got off. The gold was then preſſed down and embelliſhed as in the former method; and had this advantage, that the ſurface of the ſilver under it having been made rough, it adhered more firmly, ſo as not to be in danger of coming off, as M. du Fay ſays the gold applied in his way ſometimes did. The artiſt, however, found the proceſs ſo troubleſome, that though he purchaſed the receipt for a conſiderable ſum, he has laid the practice aſide.”

Finally, ſome metals, particularly ſilver, may be gilt in the following manner:

11 **Eaſy method of gilding ſilver.**

Let gold be diſſolved in aqua-regia. In this ſolution pieces of linen are to be dipt, and burnt to black aſhes. Theſe aſhes being rubbed on the ſurface of the ſilver by means of a wet linen rag, apply the particles of gold which they contain, and which by this method adhere very well. The remaining part of the aſhes is to be waſhed off; and the ſurface of the ſilver, which in this ſtate does not ſeem to be gilt, is to be burniſhed with a blood-ſtone, till it acquire a fine colour of gold. This method of gilding is very eaſy, and conſumes a very ſmall quantity of gold. Moſt gilt ornaments upon fans, ſnuff-boxes, and other toys of much ſhow and little value, are nothing but ſilver gilt in this manner.

12 **Methods of gilding glaſs.**

Gold may alſo be applied to glaſs, porcelain, and other vitrified matters. As the ſurface of theſe matters is very ſmooth, and conſequently is capable of a very perfect contact with gold leaves, theſe leaves adhere to them with ſome force, although they are not of a metallic nature. This gilding is ſo much more perfect, as the gold is more exactly applied to the ſurface of the glaſs. The pieces are then to be expoſed to a certain degree of heat, and burniſhed ſlightly to give them luſtre.

A more ſubſtantial gilding is fixed upon glaſs, enamel, and porcelain, by applying to theſe ſubſtances powder of gold mixed with a ſolution of gum arabic, or with ſome eſſential oil, and a ſmall quantity of borax; after which a ſufficient heat is to be applied to ſoften the glaſs and the gold, which is then to be burniſhed. With this mixture any figures may be drawn.

The powders for this purpoſe may be made, 1. By grinding gold-leaf with honey, which is afterwards to be waſhed away with water. 2. By diſtilling to dryneſs a ſolution of gold in aqua-regia. 3. By evaporating the mercury from an amalgam of gold, taking care to ſtir well the maſs near the end of the proceſs. 4. By precipitating gold from its ſolution in aqua-regia by applying it to a ſolution of green vitriol in water, or ſome copper, and perhaps ſome other metallic ſubſtance.

GILEAD, the ſon of Machir, and grandſon of Manaſſeh, had his inheritance allotted him in the mountains of Gilead, from whence he took his name. The mountains of Gilead were part of that ridge which runs from mount Lebanon ſouthward, on the eaſt of the Holy Land; gave their name to the whole country which lies on the eaſt of the ſea of Galilee, and included the mountainous region called in the New Teſtament *Trachonites*. Jeremiah (xxii. 6.) ſeems to ſay, that Gilead begins from mount Libanus. 'Thou art Gilead unto me, and the head of Lebanon.' Jacob, at his return from Meſopotamia, came in ſix days to the mountains of Gilead (Gen. xxxi. 21, &c.) where this patriarch, with Laban his father-in-law, raiſed a heap of ſtones, in memory of their agreement and covenant, and called it *Gilead*, i. e. "an heap of witneſſes," and which Laban called *Jegar-ſahadutha*. Theſe mountains are covered with a ſort of trees abounding with gum, called the *balm of Gilead*, which the ſcripture commends much. (Jer. viii. 21. xlvi. 11. li. 8.) The merchants who bought Joſeph came from Gilead, and were carrying balm into Egypt. (Gen. xxxvii. 25.)

The Gileadites being invaded by the Ammonites, &c. choſe Jephthah for their general, who vanquiſhed all their enemies.

Balm of GILEAD. See AMYRIS.

GILGAL (anc. geog.), a place between Jericho and Jordan, noted for the firſt encampment of the Iſraelites on this ſide Jordan, about a mile from Jericho. It ſometimes alſo denotes Galilee, (Joſhua xii. 23.)

GILL (John), D. D. a Proteſtant diſſenting miniſter of the Baptiſt denomination, and the ſon of Edward and Elizabeth Gill, was born at Kettering in Northhamptonſhire, November 23, 1697. At a very early period of life, his father, who was a deacon of the Baptiſt church at Kettering, diſcovered in him an uncommon capacity for learning, and his ability for literary purſuits was afterwards evidenced by ſuch rapid progreſs in whatever became the object of tuition, that it was found neceſſary to remove him from the ſchool in which his ſtriking talents were firſt manifeſted, and to place him in one more favourable to his improvement. He was therefore ſent to a grammar ſchool in the neighbourhood; where he very ſoon ſurpaſſed thoſe boys who were much his ſeniors in age and as pupils. At this ſchool he continued till he arrived at his 11th year; where, beſides going through the common ſchool-books, he read moſt of the Latin claſſics, and made very conſiderable proficiency in the Greek language.

Mr Gill's celebrity as a ſcholar, and his ſtrong attachment to books, were ſoon obſerved by the neighbouring clergy, who frequently met and converſed with him at a bookſeller's ſhop, to which he at every opportunity reſorted for the purpoſe of reading; and indeed ſuch was his application to books, that it became a proverbial ſaying among the common people, "Such a thing is as certain, as that John Gill is in the bookſeller's ſhop."

He left the grammar-ſchool, however, early in life. This was occaſioned by the imperious conduct of his maſter, who inſiſted that the children of diſſenting parents ſhould, with other ſcholars that belonged to the eſtabliſhment, attend him to church on week days during the performance of divine ſervice. The diſſenters conſidered this requiſition as a ſtretch of power to which his engagements with them gave no claim; and as it was virtually making conformity a teſt by which his pupils were to expect the benefits of tuition, they reſented his conduct; and the children of thoſe parents that were in affluent circumſtances were removed to ſeminaries where the ſame advantages might be obtained without being ſubject to the impoſitions of clerical bigotry. But as the parents of Mr Gill had it not in their power to confer on him the ſame privilege, the ſame ſteps could not be taken to facilitate his advancement in learning. To pave the way, however, for the completion of his ſtudies, efforts were made by ſeveral miniſters, of different denominations, to get him upon one or other of the funds in London. For this purpoſe, ſpecimens of his progreſs in the different branches of literature were tranſmitted to the metropolis: in anſwer to which it was objected, "that he was too young, and that ſhould he continue, as it might be expected he would, to make ſuch rapid advances in his ſtudies, he would go through the common circle before he would be capable of taking care of himſelf, or of being employed in any public ſervice." But theſe formidable objections were of no weight with our young ſcholar: his love of learning was unconquerable. Inſuperable difficulties, it is true, obſtructed the way in which literary eminence is uſually acquired; but theſe difficulties could neither repreſs his ardent deſire of knowledge, nor damp the zeal and application that had marked his former ſtudies. For though his time was daily devoted to the buſineſs of his father; yet he had ſo far improved the hours of leiſure, as to be able, before he arrived at his 19th year, to read all the Greek and Latin authors that fell in his way. He ſtudied logic, rhetoric, moral and natural philoſophy; and learnt the Hebrew language, ſo as to read it with eaſe, without any other aſſiſtance than Buxtorf's grammar and lexicon.

Neither the purſuit of learning, however, nor the other neceſſary avocations incumbent on Mr Gill, could eradicate thoſe religious impreſſions received in early life. On November 1. 1716, he made a public profeſſion of his faith before the Baptiſt church at Kettering, and was baptiſed the ſame day by Mr Thomas Willis. Of this church Mr Gill had not been long a member, before he was called to the work of the miniſtry: ſoon after which he removed to Higham-Ferrers, with a view to purſue his ſtudies under the direction of Mr Davis; but his ſtay at this place was ſoon interrupted by an invitation from London in 1719, to preach to the Baptiſt church in Horſlydown, over which he was the ſame year, being the 22d of his age, ordained paſtor; which office he ſuſtained upwards of 51 years.

Mr Gill had not been long in London before rabbinical learning, of which he had before conſiderable knowledge, became an object of purſuit. To facilitate his progreſs through the intricacies of this labyrinth, he contracted an acquaintance with one of the moſt learned Jewiſh rabbies. He read the Targums, the Talmuds, the Rabbot; their ancient commentaries, the book Zohar, and whatever elſe of this kind he was able to procure. Of the Oriental languages he made himſelf a complete maſter: in ſhort, there was no branch of knowledge that could either enlarge or enrich biblical learning, which, however difficult, was not attempted and attained: and it may be truly aſſerted, that in this line he had but few equals, and that the annals of literature do not exhibit a character by whom he was excelled.

In 1748 Mr Gill publiſhed a commentary on the New Teſtament in three vols folio. The immenſe reading and learning diſcoverable in this arduous work, attracted the attention of the Mariſchal College and Univerſity of Aberdeen; and procured for him, without either his ſolicitation or his knowledge, a diploma, creating him Doctor of divinity. This intelligence was communicated to the Doctor in the moſt handſome terms by the profeſſors Oſborn and Pollock; who declared, "that on account of his knowledge of the ſcriptures, of the Oriental languages, and of Jewiſh antiquities, of his learned defence of the ſcriptures againſt Deiſts and Infidels, and the reputation gained by his other works; the univerſity had, without his privity, unanimouſly agreed to confer on him the degree of Doctor in divinity."

Dr Gill's ſentiments, as a divine, were throughout Calviniſtic: "And perhaps no man (ſays the Reverend Mr Toplady, a miniſter in the Church of England) ſince the days of Auſtin, has written ſo largely in defence of the ſyſtem of grace: and certainly no man has treated that momentous ſubject in all its branches, more cloſely, judiciouſly, and ſucceſsfully. What was ſaid of Edward the black prince, that he never fought a battle which he did not win; what has been remarked of the great Duke of Marlborough, that he never undertook a ſiege which he did not carry; may be juſtly accommodated to our great philoſopher and divine; who, ſo far as the diſtinguiſhing doctrines of the goſpel are concerned, never beſieged an error which he did not force from its ſtrongholds, nor ever encountered an adverſary whom he did not baffle and ſubdue. His learning and labours, if exceedable, were exceeded only by the invariable ſanctity of his life and converſation. From his childhood to his entrance to his miniſtry, and from his entrance on the miniſtry to the moment of his diſſolution, not one of his moſt inveterate oppoſers was ever able to charge him with the leaſt ſhadow of immorality. Himſelf, no leſs than his writings, demonſtrated that the doctrine of grace does not lead to licentiouſneſs. Thoſe who had the honour and happineſs of being admitted into the number of his friends, can go ſtill farther in their teſtimony. They know that his moral demeanor was more than blameleſs: it was from firſt to laſt conſiſtently exemplary. And indeed an undeviating conſiſtency, both in his views of evangelical truths, and in his obedience as a ſervant of God, was one of thoſe qualities by which his caſt of character was eminently marked. He was in every reſpect a burning and ſhining light: Burning with love to God, to truth, and to ſouls; ſhining as an example to believers, in word, in faith, in purity, a pattern of good works, and a model of all holy converſation and godlineſs; and while true religion and ſound learning have a ſingle friend remaining in the Britiſh empire, the works and name of Gill will be precious and revered."

He died at Camberwell, October 14. 1771, aged 73 years 10 months and 10 days. In 1718 the Doctor married Mrs Elizabeth Negus; by whom he had many children, two of whom only ſurvived him. Mrs Gill died in 1764.

His works are, A Commentary on the Old and New Teſtament, in 9 vols folio. A Body of Divinity in 3 vols quarto. The Cauſe of God and Truth, 4 vols octavo. A Treatiſe concerning the Prophecies of the Old Teſtament reſpecting the Meſſiah. A Diſſertation on the antiquity of the Hebrew Language, Letters, Vowel-Points, and Accents. Sermons on the Canticles, folio; beſides a great number of ſermons and controverſial pieces on different ſubjects.

GILL, a meaſure of capacity, containing a quarter of an Engliſh pint.

GILLS, or BRANCHIÆ of fiſhes. See *COMPARATIVE Anatomy*, n160.

GILLINGHAM, a pariſh in the county of Dorſetſhire, on the river Stour, near the foreſt of its own name; where, *anno* 1016, king Edmund Ironſide vanquiſhed the Danes. It is one of the largeſt pariſhes in the county, being 41 miles in circuit, containing 64,000 acres. It lies on the borders of Wilts and Somerſet 4 miles N. W. of Shaftſbury. It has a manufacture of linen, but the chief produce is grazing and the dairies. Near it are the traces of an ancient reſidence of Norman or Saxon kings, 340 feet long and 240 broad, ſurrounded by a rampart of earth. Henry I. reſided here, and king John repaired it at the expence of the county. Edward I. ſpent his Chriſtmas here in 1270; but the whole of the materials are removed, and the foundation of the houſe only can be traced, which was in the form of the letter L, in length 180 feet by 80 broad, and the foot of the letter 48 by 40. The area of the houſe containing 168,000 ſquare feet. It ſtood half a mile from the church, on the road to Shaſton, encompaſſed by a moat, now dry, in ſome places 9 feet deep and 20 broad. The rampart appears to have been 30 feet thick. Here is a free ſchool, a large old building, and a workhouſe, as well as two ſtone bridges, In 1694 it received damage of near 4000l. by a fire. Near it is Gillingham foreſt, four miles long and one mile broad. The church is a large ancient fabric.

GILLINGHAM, a pariſh of Kent, three miles below Chatham, and on the ſame ſide of the Medway. Part of Catham-dock is in the pariſh; and here is a caſtle well furniſhed with guns that commands the river, there being no leſs than 170 embrazures for cannon; which would ſtop the progreſs of any enemy that ſhould happen to make way by Sheerneſs-fort, before they could reach Chatham. Here are alſo copperas works. At this place 600 Norman gentlemen, who came over in the retinue of the two princes Alfred and Edward, were all barbarouſly murdered by earl Godwin. It was in remote times the property of the archbiſhop of

Canterbury, who had here an elegant palace, the old hall of which is now converted into a barn: it is built principally of flint, but the windows are filled up with brick. Near it are the remains of the chapel, &c. and a great part of the whole of its original outer walls may be traced.

GILOLO, a large iſland of the Pacific Ocean, lying between 1° S. Lat. and 2° N. Lat. and between 125° and 128° E. Long. It belongs to the Dutch; but does not produce any of the fine ſpices, though it lies in the neighbourhood of the ſpice-iſlands. The natives are fierce and cruel ſavages.

GILPIN (Bernard), rector of Houghton, diſtinguiſhed by his extraordinary piety and hoſpitality, was deſcended from an ancient and honourable family in Weſtmoreland, and born in 1517. As he was bred in the Catholic religion, ſo he for ſome time defended it againſt the reformers, and at Oxford held a diſputation with Hooper afterward biſhop of Worceſter and martyr for the Proteſtant faith; but was ſtaggered in another diſputation with Peter Martyr, and began ſeriouſly to examine the conteſted points by the beſt authorities. Thus, being preſented to the vicarage of Norton in the dioceſe of Durham, he ſoon reſigned it, and went abroad to conſult eminent profeſſors on both ſides; and after three years abſence returned a little before the death of queen Mary, ſatisfied in the general doctrines of the reformation. He was kindly received by his uncle Dr Tonſtall, biſhop of Durham; who ſoon after gave him the archdeaconry of Durham, to which the rectory of Eſſington was annexed. When repairing to his pariſh, though the perſecution was then at its height, he boldly preached againſt the vices, errors and corruptions of the times, eſpecially in the clergy, on which a charge conſiſting of 13 articles was drawn up againſt him, and preſented in form to the biſhop. But Dr Tonſtal found a method of diſmiſſing the cauſe in ſuch a manner as to protect his nephew, without endangering himſelf, and ſoon after preſented him to the rich living of Houghton le Spring. He was a ſecond time accuſed to the biſhop, and again protected; when his enemies, enraged at this ſecond defeat laid their complaint before Dr Bonner, biſhop of London; who immediately gave orders to apprehend him. Upon which Mr Gilpin bravely prepared for martyrdom; and ordering his houſe-ſteward to provide him a long garment that he might make a decent appearance at the ſtake, ſet out for London. Luckily, however, he broke his leg on the journey; which protracted his arrival untill the news of the queen's death freed him from all further apprehenſions. Being immediately ſet at liberty, he returned to Houghton, where he was received by his pariſhioners with the ſincereſt joy.

Upon the deprivation of the Popiſh biſhops, he was offered the ſee of Carliſle, which he declined; and confining his attention to his rectory, diſcharged all the duties of his function in the moſt exemplary manner. To the greateſt humanity and courteſy, he added an unwearied application to the inſtruction of thoſe under his care. He was not ſatisfied with the advice he gave in public, but uſed to inſtruct in private; and brought his pariſhioners to come to him with their doubts and difficulties. He had a moſt engaging manner towards thoſe whom he thought well-diſpoſed; nay, his very reproof was ſo conducted, that it ſeldom gave offence; the becoming gentleneſs with which it was urged, made it always appear the effect of friendſhip. Thus, with unceaſing aſſiduity, did he employ himſelf in admoniſhing the vicious, and encouraging the well-intentioned; by which means in a few years, he made a greater change in his neighbourhood than could well have been imagined. A remarkable inſtance, what reformation a ſingle man may effect, when he hath it earneſtly at heart!

But his hopes were not ſo much in the preſent generation as in the ſucceeding. It was an eaſier taſk, he found, to prevent vice, than to correct it; to form the young to virtue, than to amend the bad habits of the old. He employed much of his time, therefore, in endeavouring to improve the minds of the younger part of his pariſh; ſuffering none to grow up in an ignorance of their duty; but preſſing it as the wiſeſt part to mix religion with their labour, and amidſt the cares of this life to have a conſtant care upon the next. He attended to every thing which might be of ſervice to his pariſhioners. He was very aſſiduous in preventing all law-ſuits among them. His hall is ſaid to have been often thronged with people, who came to him about their differences. He was not indeed much acquainted with law; but he could decide equitably, and that ſatisfied: nor could his ſovereign's commiſſion have given him more weight than his own character gave him.

His hoſpitable manner of living was the admiration of the whole country. He ſpent in his family every fortnight 40 buſhels of corn, 20 buſhels of malt, and a whole ox; beſides a proportionable quantity of other kinds of proviſion. Strangers and travellers found a cheerful reception. All were welcome that came; and even their beaſts had ſo much care taken of them, that it was humorouſly ſaid, "If a horſe was turned looſe in any part of the country, it would immediately make its way to the rector of Houghton's."

Every Sunday, from Michaelmas till Eaſter, was a ſort of public day with him. During this ſeaſon he expected to ſee all his pariſhioners and their families. For their reception, he had three tables well covered: the firſt was for gentlemen, the ſecond for huſbandmen and farmers, and the third for day-labourers. This piece of hoſpitality he never omitted, even when loſſes, or a ſcarcity of proviſion, made its continuance rather difficult to him. He thought it is duty, and that was a deciding motive. Even when he was abſent from home, no alteration was made in his family-expences; the poor were fed as uſual, and his neighbours entertained.

But notwithſtanding all this painful induſtry, and the large ſcope it had in ſo extended a pariſh, Mr Gilpin thought the ſphere of his benevolence yet too confined. It grieved him extremely to ſee every where, in the pariſhes around him, ſo great a degree of Ignorance and ſuperſtition, occaſioned by the ſhameful neglect of the paſtoral care in the clergy of thoſe parts. Theſe bad conſequences induced him to ſupply, as far as he could, what was wanting in others. For this purpoſe, every year he uſed regularly to viſit the moſt neglected pariſhes in Northumberland, Yorkſhire, Cheſhire, Weſtmoreland, and Cumberland; and that his own pariſh in the mean time might not ſuffer, he

Gilpin.

he was at the expence of a conſtant aſſiſtant. In each place he ſtaid two or three days; and his method was, to call the people about him, and lay before them, in as plain a way as poſſible, the danger of leading wicked or even careleſs lives; explaining to them the nature of true religion; inſtructing them in the duties they owed to God, their neighbour, and themſelves: and ſhowing them how greatly a moral and religious conduct would contribute to their preſent as well as future happineſs.

As Mr Gilpin had all the warmth of an enthuſiaſt, though under the direction of a very calm and ſober judgment, he never wanted an audience, even in the wildeſt parts; where he rouſed many to a ſenſe of religion, who had contracted the moſt inveterate habits of inattention to every thing of a ſerious nature. And wherever he came, he uſed to viſit all the gaols and places of confinement; few in the kingdom having at that time any appointed miniſter. And by his labours, and affectionate manner of behaving, he is ſaid to have reformed many very abandoned perſons in thoſe places. He would employ his intereſt likewiſe for ſuch criminals whoſe caſes he thought attended with any hard circumſtances, and often procured pardons for them.

There is a tract of country upon the border of Northumberland, called *Reads-dale* and *Tine-dale*, of all barbarous places in the north, at that time the moſt barbarous. Before the Union, this place was called the *debateable land*, as ſubject by turns to England and Scotland, and the common theatre where the two nations were continually acting their bloody ſcenes. It was inhabited by a kind of deſperate banditti, rendered fierce and active by conſtant alarms: they lived by theft, uſed to plunder on both ſides of the barrier; and what they plundered on one, they expoſed to ſale on the other; by that means eſcaping juſtice. And in this dreadful country, where no man would even travel that could help it, Mr Gilpin never failed to ſpend ſome part of every year.

He genarally choſe the chriſtian holidays for his journey, becauſe he found the people at that ſeaſon moſt diſengaged, and moſt eaſily aſſembled. He had ſet places for preaching which were as regularly attended as the aſſize-towns of a circuit. If he came where there was a church, he made uſe of it: if not, of barns, or any other large building; where great crouds of people were ſure to attend him, ſome for his inſtructions, and others for his charity.—This was a very difficult and laborious employment. The country was ſo poor, that what proviſion he could get, extreme hunger only could make palatable. The inclemency of the weather, and the badneſs of the roads through a mountainous country, and at that ſeaſon covered with ſnow, expoſed him likewiſe often to great hardſhips. Sometimes he was overtaken by the night, the country being in many places deſolate for ſeveral miles together, and obliged to lodge out in the cold. At ſuch times, we are told, he would make his ſervant ride about with his horſes; whilſt himſelf on foot uſed as much exerciſe as his age and the fatigues of the preceding day would permit. All this he cheerfully underwent; eſteeming ſuch ſervices well compenſated by the advantages which he hoped might accrue from them to his uninſtructed fellow-creatures.

Gilpin.

The diſintereſted pains he took among theſe barbarous people, and the good offices he was always ready to do them, drew from them the warmeſt and ſincereſt expreſſions of gratitude. Indeed he was little leſs than adored among them, and might have brought the whole country almoſt to what he pleaſed. One inſtance that is related, ſhows how greatly he was revered. By the careleſſneſs of his ſervants, his horſes were one day ſtolen. The news was quickly propagated, and every one expreſſed the higheſt indignation at the fact. The thief was rejoicing over his prize, when by the report of the country, he found whoſe horſes he had taken. Terrified at what he had done, he inſtantly came trembling back, confeſſed the fact, returned the horſes, and declared he believed the devil would have ſiezed him directly, had he carried them off knowing them to have been Mr Gilpin's.

We have already taken notice of Mr Gilpin's uncommonly generous and hoſpitable manner of living. The value of his rectory was about 400l. a-year: an income, indeed, at that time very conſiderable, but yet in appearance very unproportionate to the generous things he did: indeed, he could not have done them, unleſs his frugality had been equal to his generoſity. His friends, therefore, could not but wonder to find him, amidſt his many great and continual expences, entertain the deſign of building and endowing a grammar-ſchool: a deſign, however, which his exact œconomy ſoon enabled him to accompliſh, though the expence of it amounted to upwards of 500l. His ſchool was no ſooner opened, than it began to flouriſh; and there was ſo great a reſort of young people to it, that in a little time the town was not able to accommodate them. He put himſelf, therefore, to the inconvenience of fitting up a part of his own houſe for that purpoſe, where he ſeldom had fewer than 20 or 30 children. Some of theſe were the ſons of perſons of diſtinction, whom he boarded at eaſy rates: but the greater part were poor children, whom he not only educated, but clothed and maintained; he was at the expence likewiſe of boarding in the town many other poor children. He uſed to bring ſeveral every year from the different parts where he preached, particularly Raidſ-dale and Tine-dale; which places he was at great pains in civilizing, and contributing not a little towards rooting out that barbariſm which every year prevailed leſs among them.

As to the ſchool, he not only placed able maſters in it, whom he procured from Oxford, but himſelf likewiſe conſtantly inſpected it. And, that encouragement might quicken the application of his boys, he always took particular notice of the moſt forward: he would call them *his own ſcholars*, and would ſend for them often into his ſtudy, and there inſtruct them himſelf. One method uſed by him to fill his ſchool was a little ſingular. Whenever he met a poor boy upon the road, he would make trial of his capacity by a few queſtions, and if he found it ſuch as pleaſed him, he would provide for his education. And beſides thoſe whom he ſent from his own ſchool to the univerſities, and there wholly maintained, he would likewiſe give to others, who were in circumſtances to do ſomething for themſelves, what further aſſiſtance they needed. By which means he induced many parents to allow their children a liberal education, who otherwiſe would not have done it. And Mr Gilpin did not think it enough to afford the means only of an academical education to theſe young people, but endeavoured to make it as beneficial to them as he could. He ſtill conſidered himſelf as their proper guardian; and ſeemed to think himſelf bound to the public for their being made uſeful members of it, as far as it lay in his power to make them ſo. With this view he held a punctual correſpondence with their tutors; and made the youths themſelves frequently write to him, and give him an account of their ſtudies. So ſolicitous indeed was he about them, knowing the many temptations to which their age and ſituation expoſed them, that once every other year he generally made a journey to the univerſities to inſpect their behaviour. And this uncommon care was not unrewarded; for many of his ſcholars became ornaments to the church, and exemplary inſtances of piety.

To the account that hath been already given of Mr Gilpin's hoſpitality and benevolence, the following particulars may be added. Every Thurſday throughout the year, a very large quantity of meat was dreſſed wholly for the poor; and every day they had what quantity of broth they wanted. Twenty-four of the pooreſt were his conſtant penſioners. Four times in the year a dinner was provided for them; when they received from his ſteward a certain quantity of corn, and a ſum of money: and at Chriſtmas they had always an ox divided among them.

Whenever he heard of any in diſtreſs, whether of his own pariſh or any other, he was ſure to relieve them. In his walks abroad, he would frequently bring home with him poor people, and ſend them away clothed as well as fed. He took great pains to inform himſelf of the circumſtances of his neighbours, that the modeſty of the ſufferer might not prevent his relief. But the money beſt laid out was, in his opinion, that which encouraged induſtry. It was one of his greateſt pleaſures to make up the loſſes of his laborious neighbours, and prevent their ſinking under them. If a poor man had loſt a beaſt, he would ſend him another in his room: or if any farmer had had a bad year, he would make him an abatement in his tythes.—Thus as far, as he was able, he took the misfortunes of his pariſh upon himſelf; and, like a true ſhepherd, expoſed himſelf for his flock. But of all kinds of induſtrious poor, he was moſt forward to aſſiſt thoſe who had large families; ſuch never failed to meet with his bounty, when they wanted to ſettle their children in the world.

In the diſtant pariſhes where he preached, as well as in his own neighbourhood, his generoſity and benevolence were continually ſhowing themſelves; particularly in the deſolate parts of Northumberland. “When he began his journey,” ſays an old manuſcript life of him, “he would have 10 pounds in his purſe; and at his comming home, he would be 20 nobles in debt, which he would always pay within a fortnight after.”—In the gaols he viſited, he was not only careful to give the priſoners proper inſtructions, but uſed to purchaſe for them likewiſe what neceſſaries they wanted.

Even upon the public road, he never let ſlip an opportunity of doing good. He has often been known to take off his cloak and give it to an half-naked traveller: and when he has had ſcarce money enough in his pocket to provide himſelf a dinner, yet would he give away part of that little, or the whole, if he found any who ſeemed to ſtand in need of it.—Of this benevolent temper, the following inſtance is preſerved. One day returning home, he ſaw in a field ſeveral people crowding together; and judging ſomething more than ordinary had happened, he rode up, and found that one of the horſes in a team had ſuddenly dropped down, which they were endeavouring to raiſe; but in vain, for the horſe was dead. The owner of it ſeemed much dejected with his misfortune; and declaring how grievous a loſs it would be to him, Mr Gilpin bade him not be diſheartened: “I'll let you have (ſays he), honeſt man, that horſe of mine,” and pointed to his ſervant's—“Ah maſter (replied the countryman), my pocket will not reach ſuch a beaſt as that.” “Come, come (ſaid Mr Gilpin), take him, take him; and when I demand my money, then thou ſhalt pay me.”

This worthy and excellent divine, who merited and obtained the glorious titles of *the Father of the Poor*, and *the Apoſtle of the North*, died in 1583, in the 66th year of his age.

GILTHEAD, in ichthyology. See SPARUS.

GIN. See GENEVA.

GIN, in mechanics, a machine for driving piles, fitted with a windlaſs and winches at each end where eight or nine men heave, and round which a rope is reeved that goes over the wheel at the top: one end of this rope is ſeized to an iron-monkey, that hooks to a beetle of different weights, according to the piles they are to drive, being from eight to thirteen hundred weight; and when hove up to a croſs-piece, near the wheel, it unhooks the monkey, and lets the beetle fall on the upper end of the pile, and forces the ſame into the ground: then the monkey's own weight overhauls the windlaſs, in order for its being hooked again to the beetle.

GINGER, the root of a ſpecies of amomum. See AMOMUM.

GINGIDIUM, in botany: A genus of the digynia order, belonging to the pentandria claſs of plants. The calyx is an involucrum, with about ſix linear leaves; the corolla conſiſts of five oval-lanceolated petals; the ſtamina are five filaments; the antheræ roundiſh; the pericarpium an ovato-truncated fruit, with eight ſtriæ; there are two ſtriated ſeeds, in ſome places plane, and in others convex.

GINGIRO, or ZINDERO, a ſmall territory of Africa, to the ſouth of Abyſſinia; being ſeparated from it by the river Zebee, by which it is alſo almoſt entirely ſurrounded. This river is extremely large, having more water than the Nile, and being much more rapid; ſo that, during the rainy ſeaſon, it would be altogether impaſſable, were it not for the large rocks which are in its channel. The extreme difficulty which occurs in paſſing this river, however, is the means of preſerving the kingdom of Gingiro, which would otherwiſe be conquered in a ſingle ſeaſon by the Galla.

The moſt remarkable particular with regard to this kingdom is, that the ſovereign is a profeſſed votary of the devil. “This ſuperſtition (ſays Mr Bruce) reaches down all the weſtern ſide of the continent on the Atlantic ocean, in the countries of Congo, Angola, and Benin. In ſpite of the firmeſt foundation in true philoſophy, a traveller, who decides from the information and inveſtigation of facts, will find it very difficult to treat theſe appearances as abſolute fictions, or as owing to the ſuperiority of cunning of one man in over-reaching another. For my own part, I confeſs, I am equally at a loſs to aſſign reaſons for diſbelieving the fiction on which their pretenſions to ſome preternatural information are founded, as to account for them by the operation of ordinary courſes."

In this kingdom every thing is conducted, or pretended to be conducted, by magic; and all thoſe ſlaves, which in other African countries are ſold to Europeans, are here ſacrificed to the devil, human blood being a neceſſary part in all their accurſed ſolemnities. "How far (ſays Mr Bruce) this reaches to the ſouthward, I do not know; but I look upon this to be the geographical bounds of the reign of the devil on the north ſide of the equator in the peninſula of Africa."

With regard to this country, very little farther is known than ſome of the cuſtoms of the people tranſiently picked up by the Jeſuit miſſionaries in Abyſſinia. From them we learn, that the kingdom is hereditary in one family, though it does not regularly deſcend to the eldeſt ſon, the king being choſen by the nobles; in which they reſemble their neighbours the Abyſſinians. When the king dies, his body is wrapped in a fine cloth, and a cow is killed. The body ſo wrapped up is next incloſed in the cow's ſkin; and all the princes of the royal family fly and hide themſelves in the buſhes, while thoſe who are entruſted with the election enter the thickets, beating about every where as if for game. At laſt a bird of prey, called in their language *liber*, appears, and hovers over the perſon deſtined to be king; crying and making a great noiſe without quitting his ſtation. By this means the perſon deſtined to be elected is found out, ſurrounded as is reported, by lions, tigers, panthers, and other wild beaſts; all which are ſuppoſed to be brought by the power of magic or of the devil.—After the king is found, he flies upon thoſe who came in queſt of him with great fury, killing and wounding as many as he can reach, until at laſt he is dragged to the throne whether he will or not. One particular family have the privilege of conducting him to the throne; and if they ſhould not happen to find him at firſt, they have a right to take him out of the hands of thoſe who did ſo; and thus another battle enſues before the vacant throne can be filled. Laſtly, before he enters his palace, two men muſt be killed; one at the foot of a tree by which the houſe is ſupported; and the other at the threſhold of the door, which is beſmeared with the blood of the victim. It is the particular privilege of one family to afford theſe victims; and ſo far are they from ſeeking to avoid this fate, that they glory in the occaſion, and willingly offer themſelves to meet it. This laſt particular, Mr Bruce ſays he had in Abyſſinia from people coming from Gingiro.

GINGIVÆ, the gums. See Gums.

GINGLYMUS, in anatomy, one of the ſpecies of articulation. It is that jointure of the bones where each bone mutually receives the other; ſo that each bone both receives and is received. See Anatomy, nº 2.

GINKGO, the maden-hair-tree. See Mauritia.

GINORA, in botany: A genus of the monogynia order, belonging to the dodecandria claſs of plants; and in the natural method ranking with thoſe of which the order is doubtful. The calyx is cleft into ſix parts; the petals ſix: the capſule unilocular, quadrivalved, coloured, and polyſpermous.

GINSENG. See Panax.

GIOIA (Flavio), of Amalfi, in the kingdom of Naples, the celebrated mathematician; who, from his knowledge of the magnetic powers, invented the mariner's compaſs, by which the navigation of the Europeans was extended to the moſt diſtant regions of the globe: before this invention, navigation was confined to coaſting. The king of Naples being a younger branch of the royal family of France, he marked the north point with a fleur de lis, in compliment to that country. It is ſaid the Chineſe knew the compaſs long before; be this as it may, the Europeans are indebted to Gioia for this invaluable diſcovery. He flouriſhed A. D. 1300.

GIORDANO (Luca.) See Jordano.

GIORGIONE, ſo called from his comely aſpect, was an illuſtrious Venetian painter, born in 1478. He received his firſt inſtructions from Giovanni Bellino; but ſtudying afterwards the works of Leonardo da Vinci, he ſoon ſurpaſſed them both, being the firſt among the Lombards who found out the admirable effects of ſtrong lights and ſhadows. Titian became his rival in this art; and was ſo careful in copying the life, that he exceeded Giorgione in diſcovering the delicacies of nature, by tempering the boldneſs of his colouring. The moſt valuable piece of Giorgione in oil is that of Chriſt carrying his croſs, now in the church of San Rovo in Venice; where it is held in great veneration. He died of the plague young, in 1511.

GIOSEPPIO, an eminent painter, ſo called by way of contraction from *Gioſeppe d' Arpino* the town of Naples where he was born in 1560. Being carried to Rome very young, and employed by painters then at work in the Vatican to grind their colours, he ſoon made himſelf maſter of the elements of deſign, and by degrees grew very famous. His wit and humour gained him the favour of popes and cardinals, who found him buſineſs in plenty. Gregory XIII. ſhowed him great reſpect; and Louis XIII. of France made him a knight of the order of St Michael. By the force of a happy genius he acquired a light and agreeable manner of deſigning; though it is remarked by De Piles, that he degenerated into a ſtyle which neither partook of true nature nor of the antique. His battles in the Capitol are the moſt eſteemed of all his pieces. He died at Rome in 1640.

GIOTTO, an ingenious painter, ſculptor, and architect of Florence, born in 1276. He was the diſciple of Cimabue; but far ſuperior to his maſter in the air of his heads, the attitudes of his figures, and in the tone of his colouring; but could not expreſs livelineſs in the eyes, tenderneſs in the fleſh, or ſtrength in the muſcles of his naked figures. He was principally admired for his works in moſaic; the beſt of which is over the grand entrance of St Peter's church at Rome.

The obſervation of Alberti on that piece is, that in the ſhip of Giotto, the expreſſion of fright and amazement of the diſciples at ſeeing St Peter walk upon the water is ſo excellent, that each of them exhibits ſome characteriſtic ſign of his terror. His death happened in 1336, and the city of Florence honoured his memory with a ſtatue of marble over his tomb.

GIRAFFE, in zoology. See Cervus.

GIRALD (Barry), or *Giraldus Cambrenſis.* See Barry.

GIRALDI (Lilio Gregorio), an ingenious critic, and one of the moſt learned men that modern Italy has produced, was born at Ferrara in 1479. He was at Rome when it was plundered by the emperor Charles V.; and having thus loſt all he had, and being tormented by the gout, he ſtruggled through life with ill fortune and ill health. He wrote, nevertheleſs, 17 performances, which were collected and publiſhed at Baſil in 2 vols folio in 1580, and at Leyden in 1696. Authors of the firſt rank have beſtowed the higheſt eulogies on Giraldus; particularly Caſaubon and Thuanus.

Giraldi (John Baptiſt Cintio), an Italian poet of the ſame family with the foregoing Lilio, was born in 1504. He was ſecretary to the duke of Ferrara, and afterwards became profeſſor of rhetoric at Pavia. He died in 1573. His works, which conſiſt chiefly of tragedies, were collected and publiſhed at Venice by his ſon Celſo Giraldi, in 1583; and ſome ſcruple not to rank him among the beſt tragic writers Italy has produced.

GIRARDON (Francis), a celebrated French architect and ſculptor, born at Troyes in 1627. Louis XIV. being informed of his great talents, ſent him to Rome with a penſion of 1000 crowns. At his return into France, he laboured for the royal palaces, and the gardens of Verſailles and Trianon; where there are many of his works executed in bronze and in marble, from the deſigns of Charles le Brun. The mauſoleum of cardinal de Richelieu, in the Sorbonne, and the equeſtrian ſtatue of Louis XIV. at the Place de Vendome, where the ſtatue and horſe are caſt in one piece, paſs for his moſt excellent performances. Girardon was profeſſor, rector, and chancellor, of the Academy of Painting and Sculpture; and had the poſt of inſpector-general of all the works done in ſculpture. He died in 1715.

GIRDERS, in architecture, the largeſt pieces of timber in a floor. Their ends are uſually faſtened into the ſummers, on breaſt-ſummers; and the joiſts are framed in at one end to the girders.

By the ſtatute for rebuilding London, no girder is to lie leſs than ten inches into the wall, and their ends to be always laid in loam, &c.

GIRDLE *(Cingulus* or *Zona)*, a belt or band of leather or other matter, tied about the reins to keep that part more firm and tight.

It was anciently the cuſtom for bankrupts and other inſolvent debtors to put off and ſurrender their girdle in open court. The reaſon of this was, that our anceſtors uſed to carry all their neceſſary utenſils, as purſe, keys, &c. tied to the girdle; whence the girdle became a ſymbol of the eſtate. Hiſtory relates, that the widow of Philip I. duke of Burgundy, renounced her right of ſucceſſion by putting off her girdle upon the duke's tomb.

The Romans always wore a girdle to tuck up the tunica when they had occaſion to do any thing: this cuſtom was ſo general, that ſuch as went without girdles, and let their gowns hang looſe, were reputed idle, diſſolute, perſons.

Maidens or *Virgins* Girdle. It was the cuſtom among the Greeks and Romans for the huſband to untie his bride's girdle. Homer, lib. xi. of his Odyſſey, calls the girdle ϖαρθενιην ζωνην, *maid's girdle.* Feſtus relates, that it was made of ſheep's wool, and that the huſband untied it in bed: he adds, that it was tied in the Herculanean knot; and that the huſband unlooſed it, as a happy preſage of his having as many children as Hercules, who at his death left ſeventy behind him.

The poets attribute to Venus a particular kind of girdle called *ceſtus*, to which they annexed a faculty of inſpiring the paſſion of love.

GIRGASHITES, or Gergesenes, an ancient people of the land of Canaan, whoſe habitation was beyond the ſea of Tiberias, where we find ſome footſteps of their name in the city of *Gergeſa*, upon the lake of Tiberias. The Jewiſh doctors inform us, that when Joſhua firſt came into the land of Canaan, the Girgaſhites took a reſolution rather to forſake their country, than ſubmit to the Hebrews, and accordingly retired into Africa. Nevertheleſs, it is certain that a good number of them ſtaid behind, ſince Joſhua (xxiv. 11.) informs us that he ſubdued the Girgaſhites, and they whom he overcame were on this ſide Jordan.

GIRGENTI, a town of Sicily, which occupies part of the ſite of the ancient *Agrigentum*. It has only one ſtreet fit for carriages. It is inhabited by 15,000 perſons; but has no remarkable buildings or works of art that deſerve mention: the only antiquities to be ſeen were a Latin inſcription of the time of the Antonines, as is pretended, relative to ſome aſſociation between Agrigentum and Lilybæum; and a piece of ancient maſonry in the foundations of a church pretended to be the remains of a temple of Jupiter. At ſome diſtance, on the old ground in the vale, ſtands the cathedral, a clumſy building patched up by barbarous architects with various diſcordant parts. This church is enriched with no works of modern painters or ſculptors that claim any title to praiſe, but the baptiſmal font is made out of an ancient ſarcophagus faced with very beautiful baſſo relievos. This ſee is the richeſt in Sicily, but has the character of being leſs enlightened and poliſhed than the reſt of the iſland. Among the curioſities belonging to the cathedral is an Etruſcan vaſe of rare ſize and preſervation. There are alſo ſome golden pateras of extreme rarity. The monaſtery of San Nicolo ſtands on a little eminence in the centre of the old city, admirably ſituated. The range of hills towards the ſouth eaſt ſinks gradually, ſo as to admit a noble reach of ſea and of plain, terminated on each ſide by thick groves of fruit-trees. Above appear the remains of ancient grandeur, wonderfully contraſted with the humble ſtraw cottages built at their feet. In the orchard of this convent is a ſquare building with pilaſters, which is ſuppoſed to have been part of the palace of the Roman prætor.

Girgenti has the convenience of a port: for which, however, it is leſs indebted to its natural ſituation than to the recent aſſiſtance of art. The harbour is formed by means of a pier carried out in three ſides of an octagon, with a battery at the head; the lighthouſe is to be erected on the cliffs on ſhore, as there is no poſſibility of raiſing it high enough on the mole without danger of ſinking. The work is admirable as to ſtrength and neatneſs, but the intention of creating a ſafe and complete haven has not been fully anſwered; the Scirocco commands it entirely, and drives in great quantities of ſand, which it is feared will in time choak up the port; even now ſhips of burden find it difficult to get in, but the Caricatore is conſiderable, and the magazines in the rocks along the ſhore are very ſpacious.

GIRONNE, or GIRONNY, in heraldry, a coat of arms divided into girons, or triangular figures, meeting in the centre of the ſhield, and alternately colour and metal.

GISCO, ſon of Himilco the Carthaginian general, was baniſhed from Carthage by the influence of his enemies. Being afterwards recalled, he was made general in Sicily againſt the Corinthians, about 309 years before the Chriſtian era, and by his ſucceſs and intrepidity he obliged the enemies of his country to ſue for peace. See CARTHAGE.

GISBOROUGH, a town of England, in the Weſt Riding of Yorkſhire, on the road from Whitby to Durham, 224 miles from London, and 4 miles from the mouth of the Tees, where is a bay and harbour for ſhips. It had formerly an abbey, which was once the common burial-place of the nobility of theſe parts, and its church by the ruins ſeems to have been equal to the beſt cathedrals in England. The ſoil, beſides its fertility in paſture and a conſtant verdure adorned with plenty of field-flowers almoſt all the year, has earths of ſundry colours, ſome iron, and mines of alum, which were firſt diſcovered in the reign of king James I. and have been ſince very much improved. Sir Paul Pindar, who firſt farmed them, paid rents to the king 12,500 l. to the Earl Muſgrave 1640 l. and to Sir William Penniman 600 l. and had moreover 800 men by ſea and land in conſtant pay; yet he was a conſiderable gainer, becauſe there was then ſcarce any other to be had, and the price was 26 l. a ton: but now there are ſeveral other alum-works in this county, which have taken a great part of the trade from hence; ſo that the works here have for ſome years lain neglected.

GITTITH, a Hebrew word occurring frequently in the Pſalms, and generally tranſlated *wine-preſſes*. The conjectures of intrepreters are various concerning this word. Some think it ſignifies a ſort of muſical inſtrument; others, that the pſalms with this title were ſung after the vintage; laſtly, others, that the hymns of this kind were invented in the city of Gath. Calmet is rather of opinion, that it was given to the claſs of young women or ſongſtreſſes of Gath to be ſung by them; Pſal. viii. 1. lxxxi. 1. lxxxiv. 1. Dr Hammond thinks that the pſalms with this title were all ſet to the ſame tune, and made on Goliah the Gittite.

GIULA, a ſtrong town of Upper Hungary, on the frontiers of Tranſilvania. It was taken by the Turks in 1566, and retaken by the Imperialiſts in 1695. It is ſeated on the river Kereſblan, in E. Long. 21. 1. N. Lat. 46. 25.

GIUSTANDEL, a large and ſtrong town of Turkey in Europe, and in Macedonia, with a Greek archbiſhop's ſee. It is ſeated near the lake Ochrida, in E. Long. 20. 50. N. Lat. 41. 10.

GLACIERS, a name given to ſome very extenſive fields of ice among the ALPS.—Mr Coxe obſerves of theſe mountains in general, that they are compoſed of many parallel chains, the higheſt of which occupy the centre, and the others gradually diminiſh in proportion as we recede from thence. The central chain appears covered with pointed rocks: all parts of which, that are not abſolutely perpendicular, lie hid under perpetual ſnow and ice even in ſummer. On each ſide of this ridge are fertile and cultivated valleys, interſperſed with numerous villages, and watered by numerous ſtreams. The elevated peaks of the central chain are covered with ſnow: but their declivities, excepting thoſe that are extremely ſteep, have all a covering of ice as well as ſnow; the intermediate parts being filled with vaſt fields of ice, terminating in the cultivated valley abovementioned. The ſame phenomena, though on a ſmaller ſcale, occur in thoſe chains that are at a diſtance from the principal one: In thoſe which are moſt remote, no ice, and ſcarcely any ſnow, is obſerved, unleſs upon ſome of the moſt elevated ſummits; and the mountains diminiſhing in height and ruggedneſs, appear covered with verdure, until at laſt they terminate in ſmall hills and plains.

Thus the glaciers may be divided into two ſorts; one occupying the deep valleys ſituated in the boſom of the Alps, diſtinguiſhed by the name of Ice-valleys; the others are thoſe which clothe the declivities and ſides of the mountains. Theſe two kinds of glaciers are diſtinguiſhed by Mr Coxe into the upper and lower glaciers.

The lower glaciers are by far the moſt conſiderable; ſome of them extending ſeveral leagues in length. They do not communicate with each other, as has been generally ſuppoſed, few of them being parallel to the central chain; but, ſtretching moſtly in a tranſverſe direction, are bordered at the higher extremity by inacceſſible rocks, and at the lower extending into the cultivated valleys. The thickneſs of the ice varies in different parts. In the glacier des Bois, which extends more than 15 miles in length, and upwards of three in breadth, M. Sauſſure found it generally from 80 to 100 feet; but he was credibly informed that in ſome places it was not leſs than 600 feet, and even more. Theſe vaſt maſſes of ice uſually reſt on an inclined plain; where, being puſhed forward by their own weight, and but weakly ſupported by the rugged rocks beneath them, they are interſected by large crevices, and have an appearance of walls, pyramids, &c. according to the poſition of the eye in viewing them. In thoſe parts, however, where they lie upon even ground, or ſuch as has only a gentle inclination, the ſurface of the ice is nearly uniform, the crevices being few and narrow, and the glacier being croſſed by travellers on foot without any difficulty. The ſurface of the ice is rough and granulated, ſo that people may walk upon it excepting ſuch places as have a ſteep deſcent. It is opaque, full of ſmall bubbles about the ſize of a pea, very porous, and greatly reſembles a mixture of ſnow and water congealed. A vaſt quantity of ſtones and earth falls down from the mountains upon the glaciers, and are by them thrown off on each ſide according to the deſcent of the ice, as will be afterwards explained. The place on which theſe reſt is more hard and elevated than the reſt of the ice, and is very difficult to walk upon; the earth is likewiſe laid upon them in ſuch regular heaps, that it appears to have been done by art. This collection of earth and ſtones is termed by the natives the *Moraine*.

Mr Coxe, who viſited the glacier des Bois, informs us, that the appearance of it at a diſtance was ſo tremendous, that it ſeemed impracticable to croſs it. Numerous and broad chaſms interſected it in every direction; but entering upon it, the company found that courage and activity were only required to accompliſh the taſk. They had large nails in their ſhoes and ſpiked ſticks; which on this occaſion were found to be particularly ſerviceable. Having paſſed the Moraine, and deſcended upon the glacier itſelf, they found the ice ſoftened by a warm wind which rendered it leſs ſlippery than uſual. Having walked acroſs it for about a quarter of an hour, they came again to the Moraine, along which they continued their journey for half an hour, and then entered upon the great body of the glacier. "Here (ſays Mr Coxe) it was curious to obſerve the numerous little rills produced by the collection of drops occaſioned by the thawing of the ice on the upper part of the glacier: theſe little rills hollow out ſmall channels, and, torrent-like, precipitate themſelves into the chaſms with a violent noiſe, increaſing the body of waters formed by the melting of the interior ſurface, and finding an outlet under the immenſe arch of ice in the valley of Chamouni, from which the Arveron ruſhes." As our traveller proceeded on his journey, he was ſurprized by the noiſe of a large fragment of rock which had detached itſelf from one of the higheſt needles, and bounded from one precipice to another with great repidity; but before it reached the plain it was almoſt reduced to duſt. "Having proceeded about an hour (ſays he), we were aſtoniſhed with a view more magnificent than imagination can conceive: hitherto the glaciers had ſcarcely anſwered my expectations, but now they far ſurpaſſed them. Nature had clad herſelf in all her terrors. Before us was a valley of ice 20 miles in extent, bounded by a circular glacier of pure unbroken ſnow, named Takul, which leads directly to the foot of Mont Blanc, and is ſurrounded by large conical rocks, terminating in ſharp points like the towers of an ancient fortification; to the right roſe a range of magnificent peaks, their intervals filled with glaciers; and far above the reſt, the magnificent ſummit of Mont Blanc, his higheſt point obſcured with clouds. He appeared of ſuch immenſe magnitude, that, at his preſence, the circumjacent mountains, however gigantic, ſeemed to ſhrink before him, and *hide their diminiſhed heads*. In half an hour we arrived at the Moraine, which forms a boundary of the valley, croſſed it, and proceeded upon a body of ice about three quarters of a mile broad. Here the ice was more even and free from chaſms than in the great valley. We then paſſed a ſecond moraine, and beyond that another maſs of ice to a third moraine: deſcending from thence we came upon the laſt ridge of ice, broader conſiderably than the two former, and full of large chaſms: it is ſeparated from the rock only by a very narrow moraine. Theſe moraines contain great quantities of cryſtal."

They continued to aſcend the valley of ice, the ſcene conſtantly increaſing in magnificence and horror; and having walked about five miles on the ice, they arrived at laſt at the foot of the eminence named *Couvercle*, where they were obliged to quit the ice. The doing this was extremely dangerous, and at one place very tremendous. It was a bulging ſmooth rock, with a precipice of conſiderable depth terminated by a vaſt crevice in the ice, which ſeemed to ſtop all further progreſs: a ſmall hollow in the middle, however, afforded room for one foot: and having fixed this, they ſprung over to the other ſide, being helped and directed by the guides who went over firſt. Having gained the top of the Couvercle, they had a view of three of the glaciers, viz. that of *Taleſre* to the left, *l'Echaut* in front, and *Takul* on the right; all uniting in that great one called the *Glacier de Bois*. The Couvercle itſelf is a moſt extraordinary rock, having the appearance of a large irregular building with many ſides; the ſubſtance of which is granite. Having reached the top, they were ſurprized with a thunder-ſtorm, from whence they took ſhelter under an impending rock. The view was exceedingly magnificent; the glaciers appearing like a rugged expanſe of frozen ſea bounded by gigantic rocks, and terminated by Mount Blanc. A ſingle rock appeared of a triangular figure, covered with Alpine plants; and which, by reaſon of its contraſt with the rugged and ſnowy mountains in the neighbourhood, has obtained the name of the *Garden*.—During this, as well as other excurſions among the Alps, Mr Coxe had occaſion to obſerve that the colour of the ſky was of a much deeper blue than in the lower regions.

The upper glaciers may be ſubdivided into thoſe which cover the ſummits, and thoſe which extend along the ſides of the Alps. Thoſe on the very ſummit, however, though they have the appearance of ice, are not ſo in reality, but conſiſt entirely of ſnow hardened by the extreme cold. M. Sauſſure found that which covered the top of Mount Blanc to be penetrable, though with difficulty, by a ſtick; but below this hard cruſt was a ſoft ſnow without coherence. The ſides are covered with a mixture of ice and ſnow; by reaſon of the ſuperior power of the ſummer ſun to diſſolve the ſnow, which afterwards congeals into hard ice.

Several conjectures have been made concerning the formation of theſe extraordinary bodies of ice. Mr Coxe agrees with M. Gruner in opinion, that they are produced by the continual diſſolution of the ſnow in ſummer, and its congelation by the ſucceeding froſts. Hence, on the ſummits of the mountains where the ſun has very little power, the glacier is ſoft, and contains no ice: as we deſcend the mountains the conſiſtence becomes firmer, becauſe there is a conſiderable mixture of ſnow-water, the congelation of which augments the hardneſs; and in the valleys, the glacier is hardeſt of all, becauſe the portion of water is there much ſuperior to that of the ſnow. Hence it ſeems plain that the glaciers derive their origin from the melting of the ſnow on the upper parts of the mountains, and the congelation of the water as it advances: and to this cauſe M. Sauſſure adds the quantity of ſnow which often rolls down into the valleys and congeals along with the water juſt mentioned.

Another queſtion concerning the glaciers naturally occurs, namely, Whether they are to be conſidered as in a ſtate of increaſe or diminution? Mr Coxe is of opinion, that they occaſionally increaſe and decreaſe; in proof of which he adduces the following obſervation. "The borders of the glacier of Montanvert are moſtly ſkirted with trees: towards its baſe a vaſt arch of ice riſes to near 100 feet in height; under which the river Arveron ruſhes with conſiderable force, and in a large body of water. As we approached the ice, we paſſed through a wood of firs; thoſe trees which ſtand at a little diſtance from the arch are about 80 feet high, and are undoubtedly of a very great age. Between theſe and the glacier the trees are of a later growth; as is evident from their texture and inferior ſize. Others ſtill ſmaller, have been overturned and enveloped in the ice: there ſeems to be a kind of regular gradation in the age of theſe ſeveral trees, from the largeſt which are ſtanding, to the ſmalleſt that lie proſtrate."—Hence our author concludes, that the glacier once extended as far as the row of ſmall firs; but that, upon its gradual diſſolution, a number of trees ſhot up on the ſpot it had occupied; ſince which time the ice has again advanced, and overturned the laſt grown trees before they had attained to any conſiderable height.—This he thinks alſo confirmed by the following fact.—"Large ſtones of granite are uſually found at a ſmall diſtance from the extremities of the glacier. Theſe ſtones have certainly fallen from the mountains upon the ice; have been carried on in its progreſs; and have tumbled into the plain upon the diſſolution or ſinking of the ice which ſupported them. Theſe ſtones, which the natives call *Moraine*, form a kind of border towards the foot of the valley of ice, and have been puſhed forward by the glacier in its advances: they extend even to the place occupied by the larger pines."

In oppoſition to thoſe who maintain that there is a conſtant accumulation of ice and ſnow in the Alpine regions, our author makes the following remarks. 1. Between the years 1776 and 1785 the glacier of Grindelevald had diminiſhed to ſuch a degree, that the ſpot which its extremity occupied in the former year, was at leaſt 400 paces from that occupied by it in the latter. 2. In the year 1785 the Murailles de Glace, which in 1776 he had deſcribed as forming the border of the glacier of Boſſon, no longer exiſted; and young trees had ſhot up in the parts which were then covered by the glacier of Montanvert. Still, however, it may be urged, that theſe changes only take place in the valleys where the power of the ſun is conſiderable; and that from thence we cannot form any adequate idea of what paſſes in the more elevated regions, where in all probability more ſnow falls than can be diſſolved. In ſupport of this opinion, it is alleged, that the cold produced by the maſs of ice already formed ought to augment it ſtill more; and that, within the memory of the preſent generation, many places have been covered with ice which were not ſo before. To theſe arguments, however, Mr Coxe replies, that the cauſes, which diminiſh the ice in the upper regions, are no leſs powerful than the cold which tends to augment it. Theſe are, 1. Rain or ſleet; which falling upon the lower glaciers, thaw the ice, increaſe the rills on its ſurface, excavate channels, and in many ways tend to diminiſh its quantity. 2. Evaporation, which takes place even from the ſurface of the ice itſelf, acts ſtill more powerfully; and its action is not confined to any particular ſeaſon. 3. The falling of the ſnow and ice; both that which comes gradually from the clouds, and which deſcends from the mountains in great maſſes, called by the natives *avalanches*. When theſe laſt fall down into milder regions, though ſometimes they may reſiſt the influence of the ſun and form ice-valleys, yet they generally diſſolve. They are moſt common in the upper glaciers, though ſometimes they deſcend upon the lower, while the gradual deſcent of ſnow from the clouds, which chiefly takes place in the lower, contributes very much to leſſen the maſs. 4. All the lower glaciers or valleys of ice reſt on an inclined plane, are hollow, and undermined by torrents which are conſtantly flowing from the upper glaciers, as well as from their own lowermoſt ſurface. Their foundation being thus conſtantly diminiſhing, the lower glaciers are carried imperceptibly forward into the cultivated fields, where an end is neceſſarily put to their progreſs by the heat of the ſun. Hence we may ſee the reaſon of that ſtrange phenomenon taken notice of by Mr Coxe, that with one hand he could touch ripe corn, and with the other ſolid ice. This deſcent of the glacier is demonſtrated from the trees overturned by it, and the moraine always obſerved at the bottom of the lower glaciers. 5. The heat of the ſun is an evident cauſe of the diminution of the glaciers. To this Mr Coxe adds another cauſe leſs generally known, viz. the warm winds which blow by night as well as by day, both in the upper and lower glaciers. "Theſe warm winds (ſays he) are during ſummer ſo common in thoſe parts, that I never croſſed a glacier without feeling in ſome particular poſitions a warmth ſimilar to the air of a hot-bath." 6. Another cauſe is the mean temperature of the earth itſelf; which, where it is not expoſed to the piercing cold of the atmoſphere, is found to have a temperature always above the freezing point. As the vaſt thickneſs of the ſuperincumbent ice, therefore, is in the preſent caſe abundantly ſufficient to prevent the acceſs of the atmoſphere, it is plain that the lower ſurface of it muſt, by being in contact with the earth, continually decay. With regard to the other argument drawn from the known increaſe of the ice in ſome places, Mr Coxe does not deny it; both inſiſts, that there is no continual increaſe of the whole, but that if it increaſes in ſome places, it diminiſhes in others; and his opinion in this reſpect was confirmed by thoſe who frequent the mountains.

GLACIS, in building, an eaſy inſenſible ſlope or declivity.

The deſcent of the glacis is leſs ſteep than that of the talus. In gardening, a deſcent ſometimes begins in talus, and ends in glacis.

The glacis of the corniche, is an eaſy imperceptible ſlope in the cymatium, to promote the deſcent and draining off the rain-water.

Glacis, in fortification, that maſs of earth which ſerves as a parapet to the covered way, ſloping eaſily towards the champaign or field.

GLADE, in gardening and agriculture, an opening and light paſſage made through a wood, by lopping off the branches of trees along that way.

GLADIATORS, in antiquity, perſons who fought, generally in the arena at Rome, for the entertainment of the people.

The gladiators were uſually ſlaves, and fought out of neceſſity; though ſometimes freemen made profeſſion thereof, like prize-fighters, for a livelihood.

The Romans borrowed this cruel diverſion from the Aſiatics; ſome ſuppoſe that there was policy in the practice, the frequent combats of gladiators tending to accuſtom the people to deſpiſe dangers and death.

The origin of ſuch combats ſeems to be as follows. From the earlieſt times with which we have any acquaintance in profane hiſtory, it had been the cuſtom to ſacrifice captives, or priſoners of war, to the manes of the great men who had died in the engagement: thus Achilles, in the Iliad, lib. xxiii. ſacrifices twelve young Trojans to the manes of Patroclus; and in Virgil, lib. xi. ver. 81. Æneas ſends captives to Evander, to be ſacrificed at the funeral of his ſon Pallas.

In courſe of time they came alſo to ſacrifice ſlaves at the funerals of all perſons of condition: this was even eſteemed a neceſſary part of the ceremony; but as it would have appeared barbarous to have maſſacred them like beaſts, they were appointed to fight with each other, and endeavour to ſave their own lives by killing their adverſary. This ſeemed ſomewhat leſs inhuman, becauſe there was a poſſibility of avoiding death, by an exertion of ſkill and courage.

This occaſioned the profeſſion of gladiator to become an art: hence aroſe maſters of the art, and men learned to fight and exerciſe it. Theſe maſters, whom the Latins called *laniſtæ*, bought them ſlaves to be trained up to this cruel trade, whom they afterwards ſold to ſuch as had occaſion to preſent the people with ſo horrible a ſhow.

Theſe exhibitions were at firſt performed near the ſepulchre of the deceaſed, or about the funeral pile; but were afterwards removed to the circus and amphitheatres, and became ordinary amuſements.

The firſt ſhow of gladiators, called *munus gladiatorum*, was exhibited at Rome, according to Valerius Maximus, by M. and D. Brutus, upon the death of their father, in the year of the city 490. On this occaſion there were probably only three pair of gladiators. In 573, the three ſons of M. Æmilius Lepidus the augur, who had been three times conſul, entertained the people with the cruel pleaſure of ſeeing 22 gladiators fight in the forum. In 547, the firſt Africanus diverted his army at New Carthage with a ſhow of gladiators, which he exhibited in honour of his father and uncle, who had begun the reduction of Spain. In proceſs of time, the Romans became ſo fond of theſe bloody entertainments, that not only the heir of any great and rich citizen lately deceaſed, but all the principal magiſtrates, preſented the people with ſhows of this nature, to procure their affection. The ædiles, pretors, conſuls, and, above all, the candidates for offices, made their court to the people, by entertaining them frequently with theſe fights: and the prieſts were ſometimes the exhibitors of the barbarous ſhows; for we meet with the *ludi pontificales* in Suetonius, Auguſt. cap. 44. and with the *ludi ſacerdotales*, in Pliny, Epiſt. lib. vii. As for the emperors, it was ſo much their intereſt to ingratiate themſelves with the populace, that they obliged them with combats of gladiators almoſt upon all occaſions: and as theſe increaſed, the number of combatants increaſed likewiſe. Accordingly, Julius Cæſar, in his ædileſhip, diverted the people with 320 couple. Titus exhibited a ſhow of gladiators, wild beaſts, and repreſentations of ſea-fights, which laſted 200 days; and Trajan continued a ſolemnity of this nature for 123 days; during which time he brought out 1000 pair of gladiators. Before this time, under the republic, the number of gladiators was ſo great, that when the conſpiracy of Catiline broke out, the ſenate ordered them to be diſperſed into the garriſon and ſecured, leſt they ſhould have joined the diſaffected party. See *GLADIATOR'S-War*.

Theſe ſports were become ſo common, and their conſequences in a variety of reſpects ſo dangerous, that Cicero preferred a law that no perſon ſhould exhibit a ſhow of gladiators within two years before he appeared candidate for any office. Julius Cæſar ordered, that only a certain number of men of this profeſſion ſhould be in Rome at a time; Auguſtus decreed, that only two ſhows of gladiators ſhould be preſented in a year, and never above ſixty couple of combatants in a ſhow; and Tiberius provided by an order of ſenate, that no perſon ſhould have the privilege of gratifying the people with ſuch a ſolemnity unleſs he was worth 400,000 ſeſterces. They were alſo conſiderably regulated by Nerva.

The emperor Claudius reſtrained them to certain occaſions: but he ſoon afterwards annulled what he decreed, and private perſons began to exhibit them at pleaſure as uſual; and ſome carried the brutal ſatisfaction ſo far as to have them at their ordinary feaſts. And not ſlaves only, but other perſons, would hire themſelves to this infamous office.

The maſter of the gladiators made them all firſt ſwear that they would fight to death; and if they failed, they were put to death either by fire or ſwords, clubs, whips, or the like.

It was a crime for the wretches to complain when they were wounded, or to aſk for death or ſeek to avoid it when overcome; but it was uſual for the emperor or the people to grant them life when they gave no ſign of fear, but waited the fatal ſtroke with courage and intrepidity: Auguſtus even decreed that it ſhould always be granted them.

From ſlaves and freedmen the inhuman ſport at length ſpread to people of rank and condition; ſo that Auguſtus was obliged to iſſue a public edict that none of the ſenatorian order ſhould become gladiators; and ſoon after he laid the ſame reſtraint on the knights: nevertheleſs Nero is related to have brought upwards of 400 ſenators and 600 Roman knights upon the arena; though Lipſius takes both theſe numbers to be falſified, and not without reaſon reduces them to 40 ſenators and 60 knights: yet Domitian, that other monſter of cruelty, refined upon Nero, exhibiting combats of women in the night-time.

Conſtantine the Great is ſaid to have firſt prohibited the combats of gladiators in the Eaſt. At leaſt he forbad thoſe who were condemned to death for their crimes to be employed; there being an order ſtill extant to the *præfectus prætorii* rather to ſend them to work in the mines in lieu thereof: it is dated at Berytus in Phœnicia the 1ſt of October 325.

The emperor Honorius forbad them at Rome on occaſion of the death of Telemachus, who coming out

Gladiator.

of the Eaſt into Rome at the time of one of theſe ſpectacles, went down into the arena, and uſed all his endeavours to prevent the gladiators from continuing the ſport; upon which the ſpectators of that carnage, fired with anger, ſtoned him to death. It muſt be obſerved, however, that the practice was not entirely aboliſhed in the Weſt before Theodoric king of the Oſtrogoths. Honorius, on the occaſion firſt mentioned, had prohibited them; but the prohibition does not ſeem to have been executed. Theodoric, in the year 500, aboliſhed them finally.

Some time before the day of combat, the perſon who preſented the people with the ſhows gave them notice thereof by programmas or bills, containing the names of the gladiators, and the marks whereby they were to be diſtinguiſhed: for each had his ſeveral badge; which was moſt commonly a peacock's feather, as appears from the ſcholiaſt of Juvenal on the 158th verſe of the third ſatire, and Turnebus Adverſ. lib. ii. cap. 8. They alſo gave notice how long the ſhows would laſt, and how many couples of gladiators there were; and it even appears from the 52d verſe of the ſeventh ſatire of the ſecond book of Horace, that they ſometimes made repreſentations of theſe things in painting, as is practiſed among us by thoſe who have any thing to ſhow at fairs.

The day being come, they began the entertainment by bringing two kinds of weapons; the firſt were ſtaves or wooden files, called *rudes;* and the ſecond were effective weapons, as ſwords, poniards, &c. The firſt were called *arma luſoria,* or *exercitoria*; the ſecond *decretoria,* as being given by decree or ſentence of the prætor, or of him at whoſe expence the ſpectacle was exhibited. They began to fence or ſkirmiſh with the firſt, which was to be the prelude to the battle; and from theſe, when well warmed, they advanced to the ſecond at the ſound of the trumpets, with which they fought naked. Then they were ſaid *vertere arma.* The terms of ſtriking were *petere & repetere;* of avoiding a blow, *exire;* and when one of the combitants received a remarkable wound, his adverſary or the people cried out, *Habet* or *Hoc habet.* The firſt part of the engagement was called *ventilare, præludere;* and the ſecond, *dimicare ad certum,* or *verſis armis pugnare:* and ſome authors think, with much probability, that it is to theſe two kinds of combat that St Paul alludes in the paſſage 1 Cor. ix. 26, 27. "I fight, not as one that beateth the air; but I keep my body, and bring it into ſubjection."

If the vanquiſhed ſurrendered his arms, it was not in the victor's power to grant him life: it was the people during the time of the republic, and the prince or people during the time of the empire, that were alone empowered to grant the boon. The reward of the conqueror was a branch of palm-tree, and a ſum of money, probably collected among the ſpectators: ſometimes they gave him his congé, or diſmiſſed him by putting one of the wooden files or *rudis* in his hand; and ſometimes they even gave him his freedom, putting the pileus on his head. The ſign or indication, whereby the ſpectators ſhowed that they granted the favour, was *premere pollicem,* which M. Dacier takes to be a clenching of the fingers of both hands between one another, and ſo holding the two thumbs upright cloſe together; and, when they would have the combat finiſhed and the vanquiſhed ſlain, *verterunt pollicem,* they bent back the thumb; which we learn from Juvenal, Sat. iii. ver. 36. The gladiators challenged or defied each other, by ſhowing the little finger; and, by extending this, or ſome other, during the combat, they owned themſelves vanquiſhed, and begged mercy from the people: *Victi oſtenſam digiti veniam a populo poſtulabant,* ſays the old ſcholiaſt on Perſius.

Gladiator,
Gladiolus.

There were various kinds of gladiators, diſtinguiſhed by their weapons, manner, and time of fighting, &c. as, The *andabatæ,* mentioned under ANDABATÆ. The *catervarii,* who always fought in troops and companies, number againſt number; or, according to others, who fought promiſcuouſly, without any certain order. The *dimachæ,* who fought armed with two poniards or ſwords, or with ſword and dagger. The *eſſedarii,* who fought in cars. The *fiſcales,* or *Cæſariani,* who belonged to the emperor's company; and who, being more robuſt and dexterous than the reſt, were frequently called for; and therefore named alſo *poſtulatitii.* Several other kinds are mentioned in the ancient authors.

GLADIATORS *War (bellum Gladiatorum* or *Spartacum),* called alſo the *ſervile war,* was a war which the Romans ſuſtained about the year of their city 680. Spartacus, Crinus, and Oenomaus, having eſcaped, with other gladiators to the number of ſeventy-four, out of the place where they had been kept at Capua, gathered together a body of ſlaves, put themſelves at their head, rendered themſelves maſters of all Campania, and gained ſeveral victories over the Roman prætors. At length they were defeated in the year 682, at the extremity of Italy; having, in vain, attempted to paſs over into Sicily.

This war proved very formidable to the Romans. Craſſus was not able to finiſh it: the great Pompey was forced to be ſent as general.

The Dying GLADIATOR, a moſt valuable monument of ancient ſculpture, which is now preſerved in the palace of Chighi. This man, when he had received the mortal ſtroke, is particularly careful *ut procumbat honeſte,* that he might fall honourably. He is ſeated in a reclining poſture on the ground, and has juſt ſtrength ſufficient to ſupport himſelf on his right arm: and in his expiring moments it is plainly ſeen, that he does not abandon himſelf to grief and dejection; but is ſolicitous to maintain that firmneſs of aſpect which the gladiators valued themſelves on preſerving in this ſeaſon of diſtreſs, and that attitude which they had learnt of the maſters of defence. He fears not death, nor ſeems to betray any tokens of fear by his countenance, nor to ſhed one tear: *quis mediocris gladiator ingemuit, quis vultum mutavit unquam, quis non modo ſtetit, verum etiam decubuit turpiter,* ſays Cicero, in that part of his Tuſculan where he is deſcribing the aſtoniſhing firmneſs of thoſe perſons. We ſee, in this inſtance, notwithſtanding his remaining ſtrength, that he has but a moment to live; and we view him with attention, that we may ſee him expire and fall: thus the ancients knew how to animate marble, and to give it almoſt every expreſſion of life.

GLADIOLUS, CORN-FLAG: A genus of the

monogynia order, belonging to the triandria claſs of plants; and in the natural method ranking under the ſixth order, *Enſatæ*. The corolla is ſexpartite, and ringent; the ſtamina aſcending and bending upwards. There are 10 ſpecies, of which the moſt remarkable is the communis, or common gladiolus. This hath a round, compreſſed, tuberous root; long ſword-ſhaped leaves; an erect flower-ſtalk, two or three feet high; the top garniſhed with ſeveral pretty large flowers of a red or white colour, having each ſix petals. They appear in May and June, and are ſucceeded by plenty of ſeed in Auguſt. The plants are very hardy, and will thrive in any ſoil or ſituation. They are propagated by offsets from the roots.

GLAIR of eggs, is the ſame as the white of eggs, and is uſed as a varniſh for preſerving paintings. For this purpoſe it is beat to an unctuous conſiſtence, and commonly mixed with a little brandy or ſpirit of wine, to make it work more freely, and with a lump of ſugar to give it body and prevent its cracking: and then ſpread over the picture or painting with a bruſh.

GLAMORGANSHIRE, a county of South Wales, ſaid to have derived its name from a contraction of the Welſh words *Gwald Morgan*, or "the county of Morgan," and ſuppoſed to have been thus called from a prince of this part of the country, ſaid to have been killed 800 years before the birth of our Saviour: but ſome other writers derive the name from the word *Mor*, which in the Britiſh tongue ſignifies the *ſea*; this being a maritime county. It is bounded on the ſouth, and part of the weſt, by Briſtol channel; on the north-weſt, by Caermarthenſhire; on the north, by Brecknockſhire; and on the eaſt, by Monmouthſhire. It extends 48 miles in length, from eaſt to weſt, 27 in breadth from north to ſouth, and is 116 in circumference. It is divided into 10 hundreds, in which are one city, 7 market-towns, 118 pariſhes, about 10,000 houſes, and 58,000 inhabitants. It is in the dioceſe of Llandaff. This county, in the time of the Romans, was part of the diſtrict inhabited by the Silures and had ſeveral Roman ſtations. Thus Boverton, a few miles to the ſouth of Cowbridge, is ſuppoſed to be the Bovium of Antoninus; Neath to be his Nidum; and Loghor, to the weſt of Swanſey, to be his Laucarum. The principal rivers of this county are the Rhymny, the Taff, the Ogmore, the Avon, the Cledaugh, and the Tave. The air, in the ſouth part, towards the ſea, is temperate and healthful; but the northern part, which is mountainous, is cold and piercing, full of thick woods, extremely barren, and thin of inhabitants. The mountains, however, ſerve to feed herds of cattle, and ſend forth ſtreams which add greatly to the fertility of the other parts of the county: they have likewiſe coal and lead ore. The ſouth part is ſo remarkably fertile, pleaſant, and populous, that it is generally ſtyled the garden of Wales; but it has no manufacture. This county was formerly full of caſtles, moſt of which are now fallen to decay. It has many ſmall harbours on the coaſt for exporting coals and proviſions. Of the former it ſends large quantities both to England and Ireland; but of the latter, to England almoſt ſolely, eſpecially butter. It ſends two members to parliament, one for the ſhire, and one for the borough of Cardiff the capital.

GLAMOUR, or GLAMER, an old term of popular ſuperſtition in Scotland, denoting a kind of magical miſt believed to be raiſed by ſorcerers, and which deluded their ſpectators with viſions of things which had no real exiſtence, altered the appearance of thoſe which really did exiſt, &c.—The eaſtern nations have a ſimilar ſuperſtition, as we may learn from the Arabian Nights Entertainments and other works of Oriental fiction.

GLAND, in anatomy. See ANATOMY, n° 128.

GLANDERS. Sea FARRIERY, § xvi.

GLANDORE, a town of Ireland, ſituated in the county of Cork and province of Munſter, near the harbour of that name.

GLANDORE-Harbour, ſituated two leagues weſt of the Galley-head in the county of Cork, province of Munſter, N. Lat. 51. 22. Weſt. Lon. 8. 56. Between this harbour and Roſs the coaſt continues high and bold, with only two ſmall coves; that to the eaſt called *Millcove*, and that to the weſt *Cowcove*. This harbour lies three miles weſt of Roſs; and though ſmall, is an exceeding good one; near it is a caſtle of the ſame name, and on the upper-end is a deep and dangerous glin, called the *Leap*. Glandore gives title of earl to the family of Croſbie.

GLANDORP (Matthias), a learned phyſician, born in 1595, at Cologn, in which town his father was a ſurgeon. After receiving a doctor's degree at Padua, and viſiting the principal towns of Italy, he ſettled at Bremen in 1618, where he practiſed phyſic and ſurgery with ſo much ſucceſs, that he was made phyſician to the republic and to the archbiſhop. He publiſhed at Bremen, *Speculum chirurgorum*, *Methodus medendæ paronychiæ*, *Tractatus de polyponarium affectu graviſſimo*, and *Gazophylacium polypuſium fontiviſſimo*; which four pieces were collected and publiſhed, with his life prefixed, at London, in 4to, 1729. Glandorp died young; and it muſt ſuggeſt a high opinion of his abilities, that, notwithſtanding the great improvements in all branches of ſcience, his works ſhould be deemed worthy a republication 100 years after his death.

GLANDULÆ *Renales*. See ANATOMY, n° 100.

GLANS, in anatomy, the tip or button of the penis, or that part covered with the prepuce, called alſo *balanus*. See ANATOMY, p. 739, col. 1.

GLANS is alſo uſed to denote the tip or extremity of the clitoris, from its reſemblance, both in form and uſe, to that of the penis. See ANATOMY, p. 739, col. 2.

GLANVIL (Joſeph), a learned and ingenious, but fanciful and credulous writer in the 17th century, was born at Plymouth in 1636, and bred at Oxford. He became a great admirer of Mr Baxter, and a zealous perſon for a commonwealth. After the reſtoration, he publiſhed *The vanity of dogmatizing*; was choſen a fellow of the Royal Society; and, taking orders in 1662, was preſented to the vicarage of Frome-Selwood in Somerſetſhire. This ſame year he publiſhed his *Lux Orientalis*; in 1665, his *Scepſis Scientifica*; and in the year following, *Some philoſophical conſiderations touching the being of witches and witchcraft*, and other pieces on the ſame ſubject. In 1660, he publiſhed *Plus ultra*; or, *The progreſs and advancement of knowledge ſince the days of Ariſtotle*. He likewiſe publiſhed

A ſeaſonable recommendation and defence of reaſon; and *Philoſophia Pia*, or *A diſcourſe of the religious temper and tendencies of the experimental philoſophy*. In 1678 he was made a prebendary of Worceſter, and died in 1680.

GLARIS, one of the cantons of Swiſſerland, is bounded on the eaſt, partly by the Griſons, and partly by the territory of Sargans; on the north, by the bailiwick of Gaſter, and by the lake Wahleſtatt; on the eaſt, by the canton of Schwits; and on the ſouth, by part of the canton of Uri, and part of the league of the Griſons. It is a mountainous country, being entirely within the Alps.

GLARIS, a town of Swiſſerland, capital of the canton of the ſame name, is ſeated in a plain, at the foot of high craggy mountains. The ſtreets are large, and the houſes kept in good repair. It has ſome public buildings; among which are two churches, one in the middle of the town, and the other without upon an eminence. On this eminence there is a cavern, with groteſque figures formed by the water that drops therein. The general aſſemblies of the country are held here on the firſt Sundays in May, where all the males above the age of ſixteen are obliged to appear. Both the Calviniſts and the Roman Catholics are tolerated in this town, and they have divine ſervice by turns in the ſame church. It is ſeated on the river Lint, E. Long. 9. 13. N. Lat. 47. 6.

GLASGOW, a large city of Lanerkſhire or Clydeſdale in Scotland, ſituated in W. Long. 4. 30. N. Lat. 55. 50.

Concerning the foundation of this city we have no authentic records. The word in the Gaelic language ſignifies a *gray ſmith*; from whence it has been inferred, that ſome ſpot in the moſt ancient part of the city was originally the reſidence of ſome blackſmith who had become eminent in his profeſſion, ſo that the place went by his name.

1
Biſhopric of Glaſgow, when founded.

In the year 560, a biſhopric is ſaid to have been founded here by Saint Mungo, or Kentigern, ſuppoſed to be the ſon of Thamates, daughter of Loth king of the Picts; but in what ſtate the town at that time was, is altogether uncertain. Moſt probably the prieſts and diſciples who attended St Kentigern would contribute conſiderably towards its advancement: the aged and infirm, who were unfit for the purpoſes of war, or ſuch as were religiouſly inclined, would come and ſettle round the habitation of the holy man, in order to have the benefit of his prayers; and as a number of miracles were ſaid to have been wrought at his tomb, the ſame cauſes would ſtill contribute to the increaſe of the town.

Hiſtory has not informed us of the name of the prince who founded and endowed the biſhopric of Glaſgow in favour of St Kentigern. But from an abſtract of the life of Kentigern (contained in Mr Innes's Critical Eſſay on the ancient inhabitants of Scotland), which was written in the 12th century, we learn, that the ſaint being ill uſed by Marken or Marcus, one of the kings of the Britons, retired into Wales. On the invitation of Roderic, however, one of Marken's ſucceſſors, he returned to Glaſgow, and enjoyed the ſee till 601, when he died. He was buried in the church of Glaſgow, where his monument is ſtill to be ſeen; and we find him marked among the ſaints in the Roman kalendar, January 13. 578.

The immediate ſucceſſors of Kentigern were Baldrede and Conwal. The firſt eſtabliſhed a religious houſe at Inchinnan; the ſecond went into Lothian to preach to the Saxons; and both of them are ranked as ſaints in the Roman kalendar, Baldrede on the 6th of March 608, and Conwal on the 18th of May 612. From this time, however, till the year 1115, we have no diſtinct accounts concerning the city or biſhopric of Glaſgow. We find then, that David I. king of Scotland made an attempt to retrieve the people from a ſtate of groſs barbarity into which they were fallen, and reſtored to the church thoſe lands of which ſhe had been robbed. The only account we have of the tranſactions with regard to Glaſgow, during that period, is in the inquiſition made by David concerning the church-lands of Glaſgow, and is as follows.—"This church, by the divine appointment, admitted St Kentigern into the biſhopric, who furniſhed large draughts of knowledge to thoſe thirſting after heavenly things, &c. But a fraudulent deſtroyer, employing his common wiles, brought in, after a long ſeries of time, unaccountable ſcandals into the Cumbrian church. For after St Kentigern and many of his ſucceſſors were removed to heaven, various diſturbances every where ariſing, not only deſtroyed the church and her poſſeſſions, but, waſting the whole country, drove the inhabitants into exile. Theſe good men being deſtroyed, various tribes of different nations flocking in from ſeveral quarters, poſſeſſed the aforeſaid deſerted country; but being of different origins, and varying from each other in their languages and cuſtoms, and not eaſily agreeing among themſelves, they followed the manners of the Gentiles, rather than thoſe of the true faith. The inhabitants of which unhappy and abandoned country, though living like brutes, the Lord, who chooſes that none ſhould periſh, vouchſafed to viſit in mercy," &c.

2
Barbarity of the people in the time of David I.

From the year 1116 to the reformation, the records of the biſhopric are tolerably complete. The moſt remarkable particulars furniſhed by them are the following.

In 1136, John Achaius, choſen biſhop of Glaſgow by David I. built and adorned part of the cathedral, which he ſolemnly conſecrated on the 9th of July. The king was preſent at the ceremony; and beſtowed on the church the lands of Perdeyk, now Patrick. This prelate alſo divided the dioceſe into the two archdeanries of Glaſgow and Teviotdale; and eſtabliſhed the offices of dean, ſubdean, chancellor, treaſurer, ſacriſt, chantor, and ſucceſſor; and ſettled a prebendary upon each of them, out of the donatives he received from the king.

In 1174, Joceline, abbot of Melroſe, was elected biſhop, and conſecrated by Eſkilus, biſhop of Lunden in Denmark, the pope's legate for that kingdom, on the 1ſt of June 1175. He rebuilt the cathedral, or rather made an addition to the church already built by John Achaius. He alſo procured a charter from William king of Scotland, erecting Glaſgow into a royal borough, and likewiſe a charter for a fair to be held there annually for eight days.

3
Glaſgow erected into a royal borough.

In 1335, John Lindſay, biſhop of Glaſgow, was killed in an engagement at ſea with the Engliſh as he was returning home from Flanders. His ſucceſſor, William Rae, built the ſtone bridge over the Clyde. In the time of Matthew Glendoning, who was elected biſhop in 1387, the great ſpire of the church, which had been built only of wood, was conſumed by lightning. The biſhop intended to have built another of ſtone, but was prevented by death, in 1408, from accompliſhing his purpoſe. His ſucceſſor, William Lauder laid the foundation of the veſtry of the cathedral, and built the great tower of ſtone as far as the firſt battlement. The great tower of the epiſcopal palace was founded about the year 1437, on which biſhop Cameron expended a great deal of money.

4 Glaſgow erected into a regality, and the univerſity founded.

In 1477, William Turnbull, a ſon of the family of Bedrule in Roxburgh-ſhire, was choſen biſhop. He obtained from king James II. in 1450, a charter erecting the town and the patrimony of the biſhops into a regality. He alſo procured a bull from pope Nicholas V. for erecting an univerſity within the city, which he endowed, and on which he alſo beſtowed many privileges. He died in 1454, leaving behind him a moſt excellent character. The eſtabliſhment of the college contributed more than any thing that had been formerly done towards the enlargement of the town. Before this time the town ſeems to have been inconſiderable. Mr Gibſon * is of opinion, that the number of its inhabitants did not exceed 1500. But though the eſtabliſhment of the univerſity greatly increaſed the number of inhabitants, it in fact deſtroyed the freedom of the town.

5 Which deſtroys the freedom of the city.

Biſhop Turnbull ſeems to have made a point of it with king James II. that the city of Glaſgow, with the biſhop's foreſt, ſhould be erected into a regality in his favour; which was acccordingly done at the time abovementioned; and this at once took away all power from the citizens, and transferred it to the biſhop. As the powers of the biſhop, however, were reckoned by Turnbull inſufficient to convey to the members of the univerſity all that freedom which he wiſhed to beſtow upon them, he therefore obtained from the king a great many privileges for them; and afterwards he himſelf, with the conſent of his chapter, granted them many more.

6 Population of Glaſgow increaſed by the univerſity.

The good effects of the eſtabliſhment of the college were very ſoon obvious in Glaſgow. The number of inhabitants increaſed exceedingly; the high ſtreet, from the convent of the Black friars, to where the croſs is now placed, was very ſoon filled up; the ancient road which led to the commons being too far diſtant for the conveniency of the new inhabitants, the Gallows-gate began to be built. Soon after the collegiate church of the bleſſed Mary (now the Tron-church) being founded by the citizens, occaſioned the Trongate ſtreet to be carried to the weſtward as far as the church. The reſt of the city increaſed gradually towards the bridge, by the building of the Salt-market-ſtreet. The borough-roads, and the cattle that grazed on the commons, were now found inſufficient to maintain the increaſed number of inhabitants; for which reaſon a greater degree of attention than formerly was paid to the fiſhing in the river. Many poor people ſubſiſted themſelves by this occupation; they were incorporated into ſociety; and in order that they might be at hand to proſecute their buſineſs, they built a conſiderable part of the ſtreet now called the *Bridge-gate*, but at that time *Fiſher's-gate*.

Notwithſtanding all this, however, the city of Glaſgow did not for a long time attain the rank among the other towns of Scotland which it holds at preſent. In 1556, it held only the 11th place among them, as appears by queen Mary's taxation. The introduction of the reformed religion proved for ſome time prejudicial to the opulence of the city. The money which had formerly been expended among the citizens by the biſhop and his clergy, was now diverted into other channels; the advantages reſulting from the univerſity were alſo for a time loſt; for as the reformers generally deſpiſed human learning, the college was in a manner deſerted.

7 Great part of the town deſtroyed by a fire.

In the time of the civil wars, Glaſgow ſuffered ſeverely. To the miſchiefs attending inteſtine diſcord, were added a peſtilence and famine; and to complete their misfortunes, a violent fire broke out in June 1652, which deſtroyed the greateſt part of the Saltmarket, Trongate, and High-ſtreet. The fronts of the houſes at that time were moſtly of wood, ſo that they became an eaſy prey to the flames. The fire continued with great violence for the ſpace of 18 hours; by which a great many of the inhabitants were ruined, the habitations of almoſt 1000 families being totally deſtroyed. On this account collections were made through different parts of the country; and to prevent ſuch accidents for the future, the fronts were built with free-ſtone, which abounds in the neighbourhood.

8 Glaſgow declared free by William and Mary.

By the charter given to biſhop Turnbull in 1450, the citizens had been deprived of the power of electing their own magiſtrates, which was thenceforth exerciſed by the biſhop; which, however, was not done without ſome reſiſtance on the part of the inhabitants. After the reformation was introduced into Scotland, we find this power exerciſed by the citizens, the biſhop, the earl of Lenox, and others. The idea that the town was a biſhop's borough, and not a royal free borough, gave occaſion to this unſettled manner of appointing the magiſtracy; and though, in 1633, they were declared to be a royal free borough by the parliament, yet their freedom of election was afterwards diſturbed by the privy-council, by Cromwell, and the duke of York. But on the 4th of June 1690, the town was declared free by a charter of William and Mary; and in confirmation of this charter it was inſerted in the act of parliament, dated June 4th the ſame year, that they ſhould have power to elect their own magiſtrates as fully and freely, in all reſpects, as the city of Edinburgh, or any other royal borough within the kingdom; which freedom of election ſtill continues.

9 Great increaſe of its wealth.

By the aſſeſſment of the boroughs in 1695, we find the city of Glaſgow reckoned the ſecond in Scotland in point of wealth, which place it ſtill continues to hold. To account for this great increaſe of wealth, we muſt obſerve, that for a long time, even before the reſtoration of Charles II. the inhabitants of Glaſgow had been in poſſeſſion of the ſale both of raw and refined ſugars for the greateſt part of Scotland; they had a privilege of diſtilling ſpirits from their molaſſes, free of all duty and exciſe; the herring fiſhery was alſo carried on to what was at that time thought a very conſiderable extent; they were the only people in Scotland who made ſoap ; and they ſent annually ſome hides, linen, &c. to Briſtol, from whence they brought back in exchange, a little tobacco, ſugar, and goods of the manufacture of England, with which they ſupplied a conſiderable part of the kingdom. From the year 1707, however, in which the union between Scotland and England took place, we may date the proſperity of Glaſgow. By the union, the American trade was laid open to the inhabitants : and ſo ſenſible were they of their advantageous ſituation, that they began almoſt inſtantly to proſecute that commerce ; an aſſiduous application to which, ever ſince, hath greatly contributed to raiſe the city to the pitch of affluence and ſplendor which it at preſent enjoys. The city was now greatly enlarged ; and as the community were ſenſible of the inconvenience that attended the want of a ſufficiency of water in the river for carrying on their commerce, they reſolved to have a port of their own nigher to the mouth of the river. At firſt, they thought of making their harbour at Dumbarton : but as this is a royal borough, the magiſtrates oppoſed it ; becauſe they thought that the influx of ſailors and others, occaſioned by the harbour, would be ſo great, that a ſcarcity of proviſions would be occaſioned.

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* *Hiſt. of Glaſgow*, p. 74.

10 Erection of Port-Glaſgow.

The magiſtrates and town-council of Glaſgow, therefore, purchaſed ſome lands on the ſouth-ſide of the river Clyde for this purpoſe ; and ſo expeditious were they in making their harbour, and rearing their town, that in 1710 a bailie was appointed for the government of Port-Glaſgow. It is now a very conſiderable pariſh, and lies 12 miles nigher the mouth of Clyde than Glaſgow.

In 1725, Mr Campbell, the member of parliament for Glaſgow, having given his vote for having the malt-tax extended over Scotland, a riot enſued among the lower claſs of people. In this diſturbance, Mr Campbell's furniture was deſtroyed, and ſome exciſemen were maltreated for attempting to take an account of the malt.

11 Diſturbance about the exciſe bill.

General Wade, who commanded the forces in Scotland, had ſent two companies of ſoldiers, under the command of Captain Buſhel, to prevent any diſturbance of this kind. Captain Buſhel drew up his men in the ſtreet, where the multitude pelted them with ſtones. He firſt endeavoured to diſperſe the mob by firing with powder only : but this expedient failing, he ordered his men to load their pieces with ball ; and, without the ſanction of the civil authority, commanded them to fire four different ways at once. By this diſcharge about 20 perſons were killed and wounded ; which enraged the multitude to ſuch a degree, that having procured ſome arms, they purſued Buſhel and his men to the caſtle of Dumbarton, about 14 miles diſtant. General Wade being informed of this tranſaction, aſſembled a body of forces, and being accompanied by Duncan Forbes, lord advocate took poſſeſſion of the town : the magiſtrates were apprehended and carried priſoners to Edinburgh ; but on an examination before the lords, their innocence clearly appeared, upon which they were immediately diſmiſſed. Buſhel was tried for murder, convicted, and condemned ; but inſtead of ſuffering the penalties of law, he was indulged with a pardon, and promoted in the ſervice. Mr Campbell petitioned the Houſe of Commons for an indemnification of his loſſes : a bill was paſſed in his favour ; and this, together with ſome other expences incurred in the affair, coſt the town 9000 l. Sterling.

During the time of the rebellion in 1745, the citizens of Glaſgow gave proof of their attachment to revolution principles, by raiſing two battalions, of 600 men each, for the ſervice of government. This piece of loyalty, however, had like to have coſt them dear. The rebels, in their journey ſouth, took a reſolution to plunder and burn the city : which would probably have been done, had not Mr Cameron of Lochiel threatened, in that caſe, to withdraw his clan. A heavy contribution, however, was laid on. The city was compelled to pay 5000 l. in money, and 500 l. in goods ; and on the return of the rebels from England, they were obliged to furniſh them with 12,000 linen ſhirts, 6000 cloth coats, 600 pairs of ſhoes, 600 pairs of hoſe, and 6000 bonnets. Theſe goods, with the money formerly paid them, the expence of raiſing and ſubſiſting the two city-battalions, and the charge of maintaining the rebel army in free quarters for ten days, coſt the community about 14,000 l. ſterling ; 10,000 l. of which they recovered in 1749, by an application to parliament.

12 Change of manners and method of living,

About the year 1750, a very conſiderable change took place in the manner of living among the inhabitants of Glaſgow. Till this time, an attentive induſtry, and a frugality bordering upon parſimony, had been their general characteriſtic : the ſeverity of the ancient manners prevailed in its full vigour : But now, when an extenſive commerce and increaſed manufactures had produced wealth, the ideas of the people were enlarged, and ſchemes of trade and improvement were adopted which people would formerly have been denominated madmen if they had undertaken ; a new ſtyle was introduced in living, dreſs, building, and furniture ; wheel-carriages were ſet up, public places of entertainment were frequented, and an aſſembly-room, ball-room, and play-houſe, were built by ſubſcription ; and from this time we may date all the improvements that have taken place, not only in Glaſgow, but all over the weſt of Scotland. The beſt method, however, of eſtimating the growing improvement of any town, is by the frequency of their applications for aſſiſtance to parliament ; we ſhall therefore enumerate the acts of parliament which have been paſſed in favour of the city of Glaſgow ſince the year 1750.

13 Acts of Parliament in favour of the city,

In 1753, an act paſſed for repairing ſeveral roads leading into the city of Glaſgow.—In 1756, an act for erecting and ſupporting a light-houſe in the iſland of Little Cumray, at the mouth of the Clyde, and for rendering the navigation of the frith and river more ſafe and commodious.—In 1759, an act for improving the navigation of the river Clyde to the city of Glaſgow, and for building a new bridge acroſs the river.—In 1767, the people of Glaſgow having propoſed to make a ſmall cut or canal from the frith of Forth to that of Clyde, for the conveniency of their trade to the eaſtern ſide of the iſland, ſeveral gentlemen at Edinburgh, and throughout different parts of the kingdom, propoſed that this canal ſhould be executed upon a much larger ſcale than what had been originally projected An act was accordingly obtained, and the canal executed in the manner deſcribed under the

the article CANAL.—In 1770, another act was obtained for improving the navigation of the river, building the bridge, &c. being an amendment of the former act for theſe purpoſes.—In 1771, an act for making and widening a paſſage from the Salt-market to St Andrew's church; for enlarging and completing the church-yard of that church, and likewiſe for building a convenient exchange or ſquare in the city; alſo for amending and explaining the former act relative to the navigation of the Clyde.—An act for making and maintaining a navigable canal and waggon-way from the collieries in the pariſhes of Old and New Monkland, to the city of Glaſgow. This laſt canal, which was undertaken with a view to reduce the price of coals, has not been attended with the deſired effect, but the other improvements have been productive of very great advantages.

14 Deſcription of the city.

The moſt ancient part of the city ſtands on a riſing ground. The foundation of the cathedral is 104 feet higher than the bed of the river; and the deſcent from the high ground reaches to about 100 yards below the college. The reſt of the city is built chiefly upon a plain, bounded ſouthward by the Clyde, and northward by a gentle ridge of hills lying in a parallel direction with that river. Theſe grounds till lately conſiſted of gardens and fields; but are now covering with buildings, in conſequence of the increaſing wealth and population of the city. The ſtreets are all clean and well paved; and ſeveral of them interſecting one another at right angles, produces a very agreeable effect. The four principal ſtreets, croſſing one another in that manner, divide the city nearly into four equal parts; and the different views of them from the croſs, or centre of interſection, have an air of great magnificence. The houſes conſiſting of four or five floors in height, are built of hewn ſtone, generally in an exceeding good taſte, and many of them elegant. The moſt remarkable public buildings are,

15 Of the cathedral.

1. *The Cathedral or High Church,* is a magnificent building, and its ſituation greatly to its advantage, as it ſtands higher than any part of the city. It has been intended to form a croſs, though the traverſe part has never been finiſhed. The great tower is founded upon four large maſſy pillars, each of them about 30 feet in circumference. The tower itſelf is 25½ feet ſquare within; and is ſurrounded by a balluſtrade, within which riſes an octangular ſpire terminated by a fane. The tower upon the weſt end is upon the ſame level, but appears not to have been finiſhed, though it is covered over with lead. In this tower is a very large bell 11 feet four inches in diameter. The principal entry was from the weſt; the gate 11 feet broad at the baſe, and 17 feet in height. The weſt end of the choir is now appropriated for a place of divine worſhip; and is divided from the remaining part by a ſtone-partition, which is incloſed by another ſtone-wall parting it from the nave. It is impoſſible to form an adequate idea of the awful ſolemnity of the place occaſioned by the loftineſs of the roof and the range of pillars by which the whole is ſupported.

The nave of the church riſes four ſteps higher than the choir; and on the weſt ſide ſtood the organ-loft, formerly ornamented with a variety of figures, but now defaced. The pillars here are done in a better taſte than thoſe in the choir, and their capitals are ornamented with fruits. The arched roof of the altar is ſupported by five pillars, over which was a fine terrace walk, and above it a large window of curious workmanſhip, but now ſhut up. On the north ſide of the altar is the veſtry, being a cube of 28 feet, the roof arched and vaulted at top, and ſupported by one pillar in the centre of the houſe. Arched pillars from every angle terminate in the grand pillar, which is 19 feet high. The lower part of the ſouth croſs is made uſe of as a burying-place for the clergy of the city; and is by much the fineſt piece of workmanſhip in the whole building. It is 55 feet long, 28 broad, and 15 high; arched and vaulted at top, and ſupported by a middle range of pillars, with their capitals highly ornamented; correſponding to which are columns adjoining to the walls, which as they riſe, ſpring into ſemi-arches, and are every where met at acute angles by their oppoſites, and are ornamented with carvings at the cloſing and croſſing of the lines. At the eaſt end of the choir you deſcend by flights of ſteps upon each ſide into paſſages which, in former times, were the principal entrance to the burying vault which is immediately under the nave. It is now made uſe of as a pariſh church for the barony of Glaſgow; and is full of pillars, ſome of them very maſſy, which ſupport the arched roof; but it is a very uncomfortable place for devotion. The ſpace under the altar and veſtry, though now made uſe of as a burying-place by the heritors of the barony, was formerly, according to tradition, employed for keeping of the relics; and indeed, from the beautiful manner in which this place is finiſhed, one would imagine that it had not been deſtined for common uſe. Here is ſhown the monument of St Mungo, or Kentigern, with his figure lying in an incumbent poſture.

The whole length of the cathedral within the walls is 284 feet, its breadth 65; the height of the choir, from the floor to the canopy, 90 feet; the height of the nave, 85 feet; the height of the middle tower, 220 feet. This fabric was begun by John Achaius in 1123, and conſecrated in 1136; and continued by ſucceeding biſhops till ſuch time as it was finiſhed in the manner in which it ſtands at preſent. The wealth of the ſee of Glaſgow, however, was not ſufficient for ſo great an undertaking, ſo that they were obliged to have recourſe to all the churches of Scotland for aſſiſtance in it.

This venerable edifice was in danger of falling a victim to the frenzy of fanaticiſm in 1579; and owed its preſervation to the ſpirit and good ſenſe of the tradeſmen, who, upon hearing the beat of drum for collecting the workmen appointed to demoliſh it, flew to arms, and declared that the firſt man who pulled down a ſingle ſtone ſhould that moment be buried under it.

Near the cathedral are the ruins of the biſhop's palace or caſtle, incloſed with a wall of hewn ſtone by archbiſhop James Beaton; the great tower built by archbiſhop Cameron.

16 St Andrew's church.

2. *St Andrew's Church* was begun by the community in 1739, and finiſhed in 1756. It is the fineſt piece of modern architecture in the city; and is built after the model of St Martin's in the Fields, London, whoſe artichect was the famous Gibbs. The length of

the church is 104 feet, and its breadth 66. It has a fine arched roof, well ornamented with figures in ſtucco, and ſuſtained by ſtone-columns of the Corinthian order. Correſpondent to the model, it has a place for the altar on the eaſt, in which is a very ancient Venetian window; but the altar-place being ſeated, makes this end appear to no great advantage. The fronts of the galleries and the pulpit are done in mahogany in a very elegant manner. The ſpire by no means correſponds with the reſt of the building; and, inſtead of being an ornament, diſgraces this beautiful fabric. Its height is 170 feet.

Beſides the cathedral (which contains three congregations) and St Andrew's church, there is a number of others, as the College-church, Ram's-horn, Tron-Wynd, &c. together with an Engliſh chapel, Highland church, ſeveral ſeceding meeting-houſes, and others for ſectaries of various denominations.

17 The college.

3. *The College.* The front of this building extends along the eaſt ſide of the high ſtreet, and is upwards of 330 feet long. The gate at the entrance is decorated with ruſtics, and over it are the king's arms. The building conſiſts of two principal courts or ſquares. The firſt is 88 feet long and 44 broad. The weſt ſide is elevated upon ſtone pillars, on which are placed pilaſters ſupporting the Doric entablature, and ornamented with arches forming a piazza. Above theſe is the public hall; the aſcent to which is by a double flight of ſteps incloſed by a handſome ſtone balluſtrade, upon the right of which is placed a lion, and on the left an unicorn, cut in free ſtone. The ſpire ſtands on the eaſt ſide, is 135 feet high, and has a very good clock. Under this is the gateway into the inner and largeſt court, which is 103 feet long and 79 broad. Over the entry, in a niche, is a ſtatue of Mr Zacharias Boyd, who was a benefactor to the univerſity. On the eaſt ſide of the court is a narrow paſſage leading into a handſome terrace walk, gravelled, 122 feet long by 64 feet broad. This walk is incloſed to the eaſt by an iron palliſade, in the centre of which is a gate leading into the garden. This laſt conſiſts of ſeven acres of ground, laid out in walks for the recreation of the ſtudents; and there is alſo a botanic garden. On the ſouth ſide of the walk ſtands the library; a very neat edifice, well conſtructed for the purpoſe intended, and containing a very valuable collection of books. Underneath are preſerved in caſes all the Roman inſcriptions found on Graham's Dike, together with altars and other antiquities collected from different parts of Scotland.—Adjoining, there is an obſervatory, well furniſhed with aſtronomical inſtruments. The college alſo poſſeſſes, by bequeſt, the late Dr Hunter's famous anatomical preparations, library, and muſeum: And in the department of natural philoſophy, it is furniſhed with an apparatus which is univerſally acknowledged to be the moſt extenſive and uſeful in Britain, and which owes its perfection to the liberality and unremitting labour of Mr Anderſon the preſent profeſſor of that ſcience.

18 Town houſe, &c.

4. *The Tolbooth,* or *Town Houſe,* is a magnificent and extremely elegant building. The front is adorned with a range of Ionic pilaſters; and is elevated on ſtrong ruſticated pillars with arches, forming a piazza for merchants and others to ſhelter themſelves from the weather when met upon buſineſs. One of the apartments was the aſſembly-hall; a neat room, 47 feet long, and 24 in breadth and height, finiſhed in a good taſte, though too ſmall for the city. The town-hall is a very ſpacious and lofty apartment, 52 feet long by 27 broad, and 24 in height. It is finiſhed in a very grand manner; the ceiling is divided into different compartments well ornamented. In it are full-length portraits of king James VI. and VII. Charles I. and II. William and Mary, queen Anne, king George I. II. and III. and Archibald duke of Argyle in his juſticiary robes. The two laſt are by Ramſay. Oppoſite to the front of this building is the exchange-walk, which is well paved with free ſtone, and incloſed from the ſtreet by ſtone pillars. In the middle of this area is an equeſtrian ſtatue of king William III. placed upon a lofty pedeſtal, and ſurrounded with an iron rail.—In 1781, the exchange under the piazzas was greatly enlarged, by taking down the lower part of the town-hall and aſſembly-room; and at the ſame time, by a tontine ſcheme entered into by the inhabitants, a moſt elegant coffee-room was added, with a ſuite of buildings adjoining for the purpoſes of a tavern and hotel, and offices for notaries and underwriters. The aſſembly-room, however, being found to be ſtill too ſmall, a ſubſcription of above L. 5000 has been raiſed by a ſimilar plan of a tontine for building a new one, which is propoſed to be erected in the north corner of one of the new ſtreets which join Ingram-ſtreet to Argyle-ſtreet.

19 Guild-hall.

5. *The Guild-Hall* or *Merchant's Houſe.* This building is ſituated upon the ſouth ſide of Bridgegate ſtreet; and is in length 82 feet, in breadth 31. The great hall, which is the whole length and breadth of the building, is ſo capacious, that it is better adapted for the reception of great and numerous aſſemblies than any other in the city. This houſe is adorned with a very elegant ſpire 200 feet high.

20 Town's hoſpital.

6. *The Town's Hoſpital* is a very neat building, conſiſting of two wings and a large front; the length 156 feet, the breadth of the centre 30 feet, and the depth of the wings 68 feet. Behind the building is an infirmary 127 feet long by 25 feet broad, the aſcent to which is by a flight of ſteps. The lower part of this building is appointed for the reception of lunatics. The area between the buildings is large, which, with the agreeable open ſituation of the hoſpital on the river, muſt conduce to the health of the inhabitants.

21 Grammar ſchool.

7. *The Grammar School* is ſituated on the new taken in grounds to the north-weſt of the town, and was built in 1787. It is a very handſome building, containing a large hall, and ſix airy commodious teaching rooms. In this ſchool there are four claſſes, the courſe being four years: each claſs is carried on the whole four years by the ſame maſter; ſo that, there being no rector, each maſter is head of the ſchool one year in rotation. It is under the direction of a committe of the town-council; who aſſiſted by the profeſſors, clergy, and other perſons of learning, frequently viſit it during the ſeſſion; and at an annual examination, prizes of books are diſtributed to the ſcholars according to their reſpective merits. The preſent number of ſcholars is above 300.—The building is not yet entirely finiſhed; and the rooms which are not yet occupied by the Latin claſſes are intended for teaching writing, arithmetic, drawing, &c.

22 New Bridge.

8. *The New Bridge* is built in an elegant manner.

It

Glaſgow.

It is 32 feet wide; with a commodious foot-way for paſſengers, five feet broad on each ſide, raiſed above the road made for carriages, and paved with free ſtone. This bridge is about 500 feet in length; and conſiſts of ſeven arches, the faces of which are wrought in ruſtic, with a ſtrong block cornice. The arches ſpring but a little way above low-water mark; which, though it renders the bridge ſtronger than if they ſprung from taller piers, diminiſhes its beauty. Between every arch there is a ſmaller circular one: theſe break the force of the water when the river riſes to a flood, and add to the ſtrength of the whole. The parapet-wall or breaſt-work is cut out in the Chineſe taſte; and the two ends are finiſhed off with a ſweep. This bridge was begun in 1768, and finiſhed in 1772.

23 Markets, &c.

2. *The Markets in King's Street* are juſtly admired, as being the completeſt of their kind in Britain. They are placed on both ſides of the ſtreet. That on the eaſt ſide, appropriated entirely for butcher-meat, is 112 feet in length, and 67 in breadth. In the centre is a ſpacious gateway, decorated on each ſide with coupled Ionic columns, ſet upon their pedeſtals, and ſupporting an angular pediment. At the north end is a very neat hall belonging to the incorporation of butchers, the front ornamented with ruſtics and a pediment. The markets upon the weſt ſide of the ſtreet conſiſt of three courts, ſet apart for fiſh, mutton, and cheeſe. The whole of the front is 173 feet, the breadth, 46 feet; in the centre of which, as on the oppoſite ſide, is a very ſpacious gateway of the Doric order, ſupporting a pediment. This is the entry to the mutton-market. Each of the other two has a well-proportioned arch faced with ruſticks for their entrance. All theſe markets are well paved with free-ſtone: have walks all round them; and are covered over for ſhelter by roofs ſtanding upon ſtone piers, under which the different commodities are expoſed to ſale. They have likewiſe pump-wells within, for cleanſing away all the filth; which render the markets always ſweet and agreeable. Theſe markets were erected in 1754.

10. *The Herb-Market* is neat and commodious; and the principal entry is decorated with columns. It is ſituated in the Candleriggs, and is laid out in the ſame manner with the markets in King's-ſtreet.

24 Guard-houſe.

11. *The Guard-Houſe* is a very handſome building, with a piazza formed by arches, and columns of the Ionic order ſet upon their pedeſtals. It was originally ſituated on the Highſtreet, at the corner of the Candleriggs ſtreet: but has lately been carried near half way up the Candleriggs, where it occupies the ground on which the weigh-houſe formerly ſtood, and is made larger and more commodious than it was before. An excellent new weigh-houſe has been erected at the head of the Candleriggs: And at the foot of the Candleriggs, or corner next the Highſtreet, where the Guard-houſe was formerly ſituated, a ſuperb new hotel has been built, containing 75 fire rooms

The moſt remarkable public charities in Glaſgow are,

25 Public charities.

1. *Muirhead's* or *St Nicholas's Hoſpital.* This was originally appointed to ſubſiſt 12 old men and a chaplain: but its revenues have, from ſome unknown cauſes, been loſt; ſo that no more of them now remains than the paltry ſum of 139 l. 2s. 5d. Scots money, 128 l. of which is annually divided among four old men, at the rate of 2 l. 13 s. 4d. each.

Glaſgow.

2. *Hutcheſon's Hoſpital,* was founded and endowed in 1639 by George Hutcheſon of Lamb-hill notary-public, and Mr Thomas Hutcheſon his brother who was bred a preacher, for the maintenance of old men and orphans. The funds of this hoſpital were increaſed by James Blair merchant in Glaſgow in 1710, and by ſubſequent donations. From the ſale of ſome of their lands which lay convenient for building, and the riſe of the reſt, the income is now above L. 1400, which is diſtributed in penſions to old people from L. 3 to L. 20, and in educating about 50 children.

3. *The Merchants-Houſe* likewiſe diſtributes in penſions and other charities about L. 800 yearly.

4. *The Town's Hoſpital,* above deſcribed, was opened for the reception of the poor on the 15th of November 1733. The funds whence this hoſpital is ſubſiſted are, the general ſeſſion, the town-council, the trades houſe and merchants houſe, the intereſt of money belonging to their funds, which are ſums that have been mortified for the uſe of the houſe. Theſe ſupplies, however, are found inſufficient to defray the expences of the houſe; for which reaſon an aſſeſſment is annually made upon the inhabitants in the following manner. The magiſtrates nominate 12, 14, or ſometimes more gentlemen of known intregity and character, who have a liſt laid before them of all the inhabitants in town. This liſt they divide into 16 or 18 columns. Each of theſe columns contains the names of ſuch inhabitants as carry on trade to a certain extent, or are ſuppoſed to be well able to pay the ſum affixed to the particular column in which their names are inſerted. If it is neceſſary to raiſe 500 l. for inſtance, then each name, in every ſeparate column, is valued at as much as the fortunes of the perſons in each particular column are ſuppoſed to be. If 100 l. or more is to be raiſed, it is only continuing a proportionable increaſe through the whole of the columns. The higheſt ſum that ever was thus raiſed, was 12 s. 6d. upon every thouſand pounds that each perſon was ſuppoſed to be worth. The number of people maintained in this hoſpital are about 620.

5. *Wilſon's Charity* for the education of boys, was founded by George Wilſon, who in 1778 left 3000 l. for that purpoſe. This fund is now conſiderably increaſed, and gives education and clothing to 48 boys, each of whom continues four years, ſo that 12 are admitted annually.

Beſides theſe, there are many public ſchools for the education of children; as well as many inſtitutions of private ſocieties for the purpoſe of relieving the indigent and inſtructing youth, ſuch as *Graham's Society, Buchan's Society,* the *Highland Society,* &c. Theſe laſt put annually 20 boys apprentices to trades, and during the firſt three years give them clothing and education.

26 Members of the univerſity.

The univerſity of Glaſgow owes its origin, as we have already obſerved, to biſhop Turnbull. The inſtitution conſiſted at firſt of a rector, a dean of faculty, a principal who taught theology, and three profeſſors of philoſophy; and, ſoon after this, the civil and canon laws were taught by ſome clergymen. From the time of its eſtabliſhment in 1450 to the reformation in 1560, the college was chiefly frequented by thoſe who were intended for the church; its members were all eccleſiaſtics, and its principal ſupport was derived from the church. The reformation brought the univerſity to the verge of deſtruction: maſters, ſtudents, and ſervants, all forſook it. The magiſtrates were ſo ſenſible of the loſs which the community had ſuſtained by this deſertion, that they endeavoured to reſtore it in 1572, by beſtowing upon it conſiderable funds, and preſcribing a ſet of regulations for its management. Theſe however, proved inſufficent; for which reaſon king James VI. erected it anew, by a charter called the *Nova Erectio*, in 1577, and beſtowed upon it teinds of the pariſh of Govan. The perſons who were to compoſe the new univerſity were, a principal, three profeſſors of philoſophy, four ſtudents burſars, one œconomus, a principal's ſervant, a janitor, and cook.

Since the year 1577, the funds of the univerſity have been conſiderably increaſed by the bounty of kings and the donations of private perſons. The profeſſors have therefore alſo been increaſed; ſo that at preſent the univerſity of Glaſgow conſiſts of a chancellor, rector, dean of faculty, principal, and 14 profeſſors (ſix of them in the gift of the crown), together with burſars, &c. The archbiſhop of Glaſgow was formerly chancellor of the univerſity *ex officio*; at preſent, the chancellor is choſen by the rector, dean of faculty, principal, and maſters.

The chancellor, as being the head of the univerſity, is the fountain of honour, and in his name are all academical degrees beſtowed. The office of rector is to exerciſe that academical juriſdiction in diſputes among the ſtudents themſelves, or between the ſtudents and citizens, which is beſtowed upon the greater part of the univerſities of Europe. He is choſen annually in the *comitia*; that is, in a meeting in which all the ſtudents, as well as the other members of the univerſity, have a voice. Immediately after his admiſſion, he has been in uſe to chooſe certain perſons as his aſſeſſors and counſellors in his capacity of judge: and in former periods, it was cuſtomary to name the miniſters of Glaſgow, or any other gentlemen who had no connection with the univerſity: but, for a great while paſt, the rector has conſtantly named the dean of faculty, the principal, and maſters, for his aſſeſſor; and he has always been, and ſtill is, in the daily practice of judging in the cauſes belonging to him, with the advice of his aſſeſſors. Beſides theſe powers as judge, the rector ſummons and preſides in the meetings of the univerſity for the election of his ſucceſſor; and he is likewiſe in uſe to call meetings of the profeſſors for drawing up addreſſes to the king, electing a member to the general aſſembly, and other buſineſs of the ſame kind.

The dean of faculty has, for his province, the giving directions with regard to the courſe of ſtudies; the judging, together with the rector, principal, and profeſſors, of the qualifications of thoſe who deſire to be created maſters of arts, doctors of divinity, &c.; and he preſides in meetings which are called by him for theſe purpoſes. He is choſen annually by the rector, principal, and maſters.

The principal and maſters, independent of the rector and dean, compoſe a meeting in which the principal preſides; and as they are the perſons for whoſe behoof chiefly the revenue of the college was eſtabliſhed, the adminiſtration of that revenue is therefore committed to them. The revenue ariſes from the teinds of the pariſh of Govan, granted by king James VI. in 1557; from the teinds of the pariſhes of Renfrew and Kilbride, granted by the ſame monarch in 1617, and confirmed by Charles I. on the 28th of June 1630; from the teinds of the pariſhes of Calder, Old and New Monkland, conveyed to them by a charter from Charles II. in 1670; from a tack of the archbiſhopric; and from ſeveral donations conferred by private perſons.

The college of Glaſgow, for a very conſiderable time after its erection, followed the mode of public teaching which is common even to this day in Oxford and Cambridge, and in many other univerſities throughout Europe; that is, each profeſſor gave a few lectures every year, *gratis*, upon the particular ſcience which he profeſſed: but, in place of this, the profeſſors have, for a great while paſt, adopted the mode of private teaching; that is, they lecture and examine two hours every day during the ſeſſion, viz. from the 10th of October to the 10th of June; a method which comes much cheaper to the ſtudent, as he has it in his power, if he is attentive, to acquire his education without being under the neceſſity of employing a tutor. They have alſo private claſſes, in which they teach one hour *per* day. The number of ſtudents who have attended this college for ſeveral years paſt, has been upwards of 500 each ſeaſon.

27
Hiſtory of the trade Glaſgow.

The trade of Glaſgow is ſaid to have been firſt promoted by one Mr William Elphinſtone in 1420. This trade was moſt probably the curing and exporting of ſalmon; but the firſt authentic documents concerning Glaſgow as a trading city is in 1546. Complaints having been made by Henry VIII. king of England, that ſeveral Engliſh ſhips had been taken and robbed by veſſels belonging to Scotland, an order of council was iſſued, diſcharging ſuch captures for the future: and among other places made mention of in this order is the city of Glaſgow. The trade which at that time they carried on could not be great. It probably conſiſted of a few ſmall veſſels to France loaded with pickled ſalmon; as this fiſhery was, even then, carried on to a conſiderable extent, by Glaſgow, Renfrew, and Dumbarton. Between the year 1630 and 1660, a very great degree of attention ſeems to have been paid to inland commerce by the inhabitants of Glaſgow. Principal Baillie informs us, that the increaſe of Glaſgow ariſing from this commerce was exceedingly great. The exportation of ſalmon and of herrings were alſo continued and increaſed. In the war between Britain and Holland during the reign of Charles II. a privateer was fitted out in Clyde to cruiſe againſt the Dutch. She was called the *Lion of Glaſgow*, Robert M'Allan commander; and carried five pieces of cannon, and 68 hands.

A ſpirit of commerce appears to have ariſen among the inhabitants of Glaſgow between the year 1660 and 1707. The citizens who diſtinguiſhed themſelves moſt during this period were Walter Gibſon and John Anderſon. Gibſon cured and packed in one year 300 laſts of herrings, which he ſent to St Martin's in France on board of a Dutch veſſel, called the *St Agate*, of 450 tons burthen; his returns were brandy and ſalt. He was the firſt who imported iron from Stockholm into Clyde. Anderſon is ſaid to have been the firſt who imported white-wines.

Whatever their trade was at this time, it could not be conſiderable: the ports to which they were obliged to trade lay all to the eaſtward: the circumnavigation of the iſland would therefore prove an almoſt unſurmountable bar to the commerce of Glaſgow: and of conſequence the people on the eaſt coaſt would be poſſeſſed of almoſt all the commerce of Scotland. The union with England opened a field for commerce for which the ſituation of Glaſgow, ſo convenient in reſpect to the Atlantic, was highly advantageous. Since that time the commerce of the eaſt coaſt has declined, and that of the weſt increaſed to an amazing degree. No ſooner was the treaty of union ſigned, than the inhabitants of Glaſgow began to proſecute the trade to Virginia and Maryland; they chartered veſſels from Whitehaven, ſent out cargoes of goods, and brought back tobacco in return. The method in which they firſt proceeded in this trade, was certainly a very prudent one. A ſupercargo went out with every veſſel. He bartered his goods for tobacco, until ſuch time as he had either ſold off his goods or procured as much tobacco as was ſufficient to load his veſſel. He then immediately ſet out on his return; and if any of his goods remained unſold, he brought them home with him. While they continued to trade in this way, they were of great advantage to the country, by the quantity of manufactures which they exported; their own wealth began to increaſe; they purchaſed ſhips of their own; and, in 1708, the firſt veſſel of the property of Glaſgow croſſed the Atlantic. Their imports of tobacco were now conſiderable, and Glaſgow began to be looked upon as a conſiderable port; the tobacco trade at the ports of Briſtol, Liverpool, and Whitehaven, was obſerved to dwindle away; the people of Glaſgow began to ſend tobacco to theſe places, and to underſell the Engliſh even in their own ports. Thus the jealouſy of the latter was ſoon excited, and they took every method in their power to deſtroy the trade of Glaſgow. The people of Briſtol, preſented remonſtrances to the commiſſioners of the cuſtoms at London againſt the trade of Glaſgow, in 1717. To theſe remonſtrances the merchants of Glaſgow ſent ſuch anſwers to the commiſſioners as convinced them that the complaints of the Briſtol merchants were without foundation. But in 1721, a moſt formidable confederacy was entered into by almoſt all the tobacco merchants in South Britain againſt the trade of Glaſgow. Thoſe of London, Liverpool, and Whitehaven, preſented ſeverally to the Lords of the Treaſury, petitions, arraigning the Glaſgow merchants of frauds in the tobacco trade. To theſe petitions the Glaſgow people gave in replies: and the Lords of the Treaſury, after a full and impartial hearing, were pleaſed to diſmiſs the cauſe with the following ~~ſentence;~~ "That the complaints of the merchants of London, Liverpool, and Whitehaven, were groundleſs; and that they proceeded from a ſpirit of envy, and not from a regard to the intereſt of trade, or of the king's revenue."

But the efforts of theſe gentlemen did not ſtophere. They brought their complaints into the Houſe of Commons. Commiſſioners were ſent from Glaſgow in 1722, who gave in their reports to the houſe in 1723. The merchants ſent up diſtinct and explicit anſwers to theſe reports but ſuch was the intereſt of their adverſaries, that theſe anſwers were diſregarded. New officers were appointed at the ports of Greenock and Port Glaſgow, whoſe private inſtructions ſeem to have been, to ruin the trade if poſſible, by putting all imaginable hardſhips upon it. Hence it languiſhed till the year 1735; but after that time it began to revive, though even after its revival it was carried on but ſlowly for a conſiderable ſpace of time.

At laſt, however, the active and enterpriſing ſpirit of the merchants, ſeconding the natural advantages of their ſituation, prevailed over all oppoſition: and the American trade continued to flouriſh and increaſe until the year 1775, inſomuch that the importation of tobacco into Clyde that year from the provinces of Virginia, Maryland, and Carolina, amounted to 57,143 hogsheads. But ſince the breach with America, this trade has now fallen greatly off, and very large ſums are ſaid to remain due to the merchants from this quarter of the world.

28 Manufactures of Glaſgow.

With regard to the manufactures of Glaſgow, Mr Gibſon is of opinion; that the commerce to America firſt ſuggeſted the idea of introducing them, in any conſiderable degree at leaſt. The firſt attempts in any way were about the year 1725, and their increaſe for ſome time was very ſlow, nor did they begin to be conſiderable till great encouragement was given by the legiſlature to the linen manufacture in Scotland. The firſt cauſes of the ſucceſs of this manufacture were the act of parliament in 1748, whereby the wearing of French cambrics was prohibited under ſevere penalties; that of 1751, allowing weavers in flax and hemp to ſettle and exerciſe their trades any where in Scotland free from all corporation-dues: and the bounty of three halfpence per yard on all linens exported at and under 18d. per yard. Since that time a ſpirit of manufacture has been excited among the inhabitants of Glaſgow; and great variety of goods, and in very great quantity, have been manufactured. Checks, linen, and linen and cotton, are manufactured to a great extent. Printed linens and cottons were begun to be manufactured in 1738; but they only made garments till 1754, when handkerchiefs were firſt printed.

Incles were firſt made here about the year 1732. The engine-looms uſed at that time were ſo inconvenient, and took up ſo much time in making the goods, that the Dutch, who were the only people poſſeſſed of the large incle-looms, were almoſt ſolely in poſſeſſion of this manufacture. Mr Hervy, who began this branch in Glaſgow, was ſo ſenſible of the diſadvantages under which it laboured, that he went over to Holland; and in ſpite of the care and attention which the Dutch took to conceal their methods of manufacturing, he brought over with him from Haerlem two of their looms, and one of their workmen. This Dutchman remained ſome years in Glaſgow: but on ſome diſguſt he went to Mancheſter, and inſtructed the people there in the method of carrying on the manufacture.

In 1757, carpets were begun to be made, and are now carried on to a conſiderabe extent. Hunters cloths, Engliſh blankets, and other goods of the ſame kind, are alſo made.

Beſides theſe, a great variety of articles are manufactured at Glaſgow, of which our limits will not permit us to enter into detail, ſuch as ſoap, refining of ſugar, iron-mongery, braſs, jewellery, glaſs both common and white, pottery, &c. Types for printing are made in this city by Dr Wilſon and Sons, equal, if not ſuperior, in beauty to any others in Britain. Printing of books was firſt began here by George Anderſon about the year 1638. But there was no good printing in Glaſgow till the year 1735, when Robert Urie printed ſeveral books in a very elegant manner. The higheſt perfection, however, to which printing hath yet been carried in this place, or perhaps in any other, was by the late Robert and Andrew Foulis, (who began in the year 1740); as the many correct and ſplendid editions of books printed by them in different languages ſufficiently teſtify. Some of their claſſics, it is ſaid, are held in ſuch high eſteem abroad, as to ſell nearly at the price of ancient MSS. The ſame gentlemen alſo eſtabliſhed an academy of painting; but the wealth of Scotland being unequal to the undertaking, it has been ſince given up.

Since the ſtagnation of the American trade, already noticed, the merchants of Glaſgow have turned their attention more to manufactures, which have of late, eſpecially that of cottons and muſlins, increaſed in a very rapid degree, and bid fair for putting the city in a more flouriſhing condition than ever it was before. The manufacturing-houſes, the influx of people for carrying on the manufactures, the means and encouragement which theſe afford to population, and the wealth thence derived by individuals as well as accruing to the community, have all tended lately to increaſe, and are daily increaſing, the extent of the city and the elegance of the buildings. Beſides various improvements in the old ſtreets, ſeveral handſome new ones as well as new ſquares have been added. The ſite of theſe new buildings is the tract of riſing ground already mentioned as the north boundary of the town previous to its late extenſion. The weſtern part of it, which is perfectly level, is occupied by a ſpacious ſquare, denominated *George's Square*; two ſides of which are built and inhabited, and a third begun. The graſs plot in the middle is incloſed with a handſome iron railing. The ſquare is deficient in regularity; the houſes on the weſt ſide being a ſtory higher than thoſe of the eaſt; but in other reſpects it is very neat. To the eaſt of this ſquare are ſeveral new ſtreets laid out and paved, and ſome of them almoſt completely built on. The principal, though as yet the moſt incomplete of thoſe ſtreets, is Ingram-Street. which runs from eaſt to weſt. From this the others begin; ſome of them being carried northward up the hill, others going ſouthward and joining the main ſtreet of the town. One of the fineſt of theſe croſs ſtreets is Hutchinſon-Street.

29 The river, &c.

The ſouth boundary of the city was mentioned to be the Clyde. Over this river there are two bridges. One of them, the Old Bridge, built about 400 years ago by archbiſhop Rae, but ſince repaired and partly rebuilt, conſiſts of eight arches; and connects the ſuburbs of Gorbals, ſituated on the oppoſite ſide of the river, with the city. The other is the New Bridge, deſcribed above.—On the banks of the river, eaſtward, is the Green; a ſpot appropriated to the uſe of the inhabitants, with conveniences for waſhing and drying linens, and with agreeable and extenſive walks for recreation.

On the ſame or ſouth ſide of the town, weſtward, is the Broomie-law, where the quay is ſituated. Till within theſe few years, the river here and for ſeveral miles diſtance, was ſo ſhallow and ſo obſtructed by ſhoals as to admit only of ſmall craft from Greenock, Port-Glaſgow, and the Highlands; but of late it has been cleared and deepened ſo as to admit veſſels of conſiderable burden; and it is intended to make the depth as nearly equal as poſſible to that of the canal, in order that the veſſels from Ireland and the weſt coaſt may not be induced excluſively to aſcend the weſt end of the canal and deliver their goods at Canal-baſon, but may come up Clyde and unload at the Broomie-law.

30 Government, revenue, &c. of the city.

The government of the city of Glaſgow is veſted in a provoſt and three bailies, a dean of guild, deacon-conveener, and a treaſurer, with a common council of 13 merchants and 12 mechanics. The provoſt and two of the bailies muſt, by the ſet of the borough, be elected from the merchant rank, and the other bailie from the trades rank, *i. e.* the mechanics. The provoſt is, from courteſy and cuſtom, ſtyled *lord provoſt*. He is properly lord of the police of the city, preſident of the community, and is *ex officio* a juſtice of the peace for both the borough and county.

The revenue of the town ariſes from a duty upon all grain and meal brought into the city (which tax is denominated *the ladles*); from the rents of lands and houſes the property of the community; from an impoſt of two pennies Scots upon every Scots pint of ale or beer brewed, inbrought, or ſold, within the city; from certain dues payable out of the markets; from the rents of the ſeats in churches; from the dues of cranage at the quay, at the weigh-houſe, &c. As to the tonnage on the river, the pontage of the bridge, and ſtatute-work; theſe, making no part of the city revenue, are kept ſeparate and diſtinct under the management of commiſſioners appointed by act of parliament.

31 Number of inhabitants

About the time of the union, the number of inhabitants in Glaſgow was reckoned about 14,000. In 1765, when a new diviſion of the pariſhes took place, they were eſtimated at 28,000. In 1785, when an accurate ſurvey was made, the number was about 36,000; beſides the ſuburbs, containing the Calton, Gorbals, and Anderſton, reckoned about 1000. Since that time many new buildings, as above noticed, have been erected, and the city has become conſiderably more populous, but no exact eſtimate has been made; though it is generally thought that the number of inhabitants cannot at preſent be computed at much leſs than 50,000

GLASS, a tranſparent, brittle, factitious body, produced from ſand melted in a ſtrong fire with fixed alkaline ſalts, lead, ſlags, &c. till the whole becomes perfectly clear and fine. The word is formed of the Latin *glaſtum*, a plant called by the Greeks *iſatis*, by the Romans *vitrum*, by the ancient Britons *guadum*, and by the Engliſh *woad*. We find frequent mention of this plant in ancient writers, particularly Cæſar, Vitruvius, Pliny, &c. who relate, that the ancient Britons painted or dyed their bodies with glaſtum, guadum, vitrum, &c. i. e. with the blue colour procured from this plant. And hence, the factitious matter we are ſpeaking of came to be called *glaſs*; as having always ſomewhat of this bluiſhneſs in it.

1 Hiſtory of glaſs making.

At what time the art of glaſs-making was firſt invented, is altogether uncertain. Some imagine it to have been invented before the flood: but of this we have no direct proof, though there is no improbability in the ſuppoſition; for we know, that it is almoſt impoſſible to excite a very violent fire, ſuch as is neceſſary in metallurgic operations, without vitrifying part of the bricks or ſtones wherewith the furnace is built. This indeed might furniſh the firſt hints of glaſs-making; tho' it is alſo very probable, that ſuch imperfect vitrifications would be obſerved a long time before people thought of making any uſe of them.

Neri traces the antiquity of glaſs as far back as the time of Job. That writer, ſpeaking of the value of wiſdom, chap. xxviii. verſe 17. ſays, that gold and *cryſtal* cannot equal it. But this word, which Neri will have to ſignify factitious glaſs, is capable of a great many different interpretations, and properly ſignifies only whatever is beautiful or tranſparent. Dr Merret will have the art to be as ancient as that of pottery or the making of bricks, for the reaſons already given, viz. that by all vehement heat, ſome imperfect vitrifications are produced. Of this kind undoubtedly was the foſſile glaſs mentioned by Ferant. Imperator. to have been found under-ground where great fires had been. But it is evident, that ſuch imperfect vitrifications might have paſſed unnoticed for ages; and conſequently we have no reaſon to conclude from thence, that the art of glaſs-making is of ſuch high antiquity.

The Egyptians boaſt, that this art was taught them by their great Hermes. Ariſtophanes, Ariſtotle, Alexander, Aphrodiſeus, Lucretius, and St John the divine, put it out of all doubt that glaſs was uſed in their days. Pliny relates, that it was firſt diſcovered accidentally in Syria, at the mouth of the river Belus, by certain merchants driven thither by a ſtorm at ſea; who being obliged to continue there, and dreſs their victuals by making a fire on the ground, where there was great plenty of the herb kali; that plant, burning to aſhes, its ſalts mixed and incorporated with the ſand, or ſtones fit for vitrification, and thus produced glaſs; and that, this accident being known, the people of Sidon in that neighbourhood eſſayed the work, and brought glaſs into uſe; ſince which time the art has been continually improving. Be this as it will, however, the firſt glaſs-houſes mentioned in hiſtory were erected in the city of Tyre, and here was the only ſtaple of the manufacture for many ages. The ſand which lay on the ſhore for about half a mile round the mouth of the river Belus was peculiarly adapted to the making of glaſs, as being neat and glittering; and the wide range of the Tyrian commerce gave an ample vent for the productions of the furnace.

Mr Nixon, in his obſervations on a plate of glaſs, found at Herculaneum, which was deſtroyed A. D. 80, on which occaſion Pliny loſt his life, offers ſeveral probable conjectures, as to the uſes to which ſuch plates might be applied. Such plates, he ſuppoſes, might ſerve for *ſpecula*, or looking-glaſſes; for Pliny, in ſpeaking of Sidon, adds, *ſiquidem etiam ſpecula excogitaverat*: the reflexion of images from theſe ancient ſpecula being effected by beſmearing them behind, or tinging them through with ſome dark colour. Another uſe in which they might be employed, was for adorning the walls of their apartments, by way of wainſcot, to which Pliny is ſuppoſed to refer by his *vitreæ cameræ*, lib. xxxvi. cap. 25. § 64. Mr Nixon farther conjectures, that theſe glaſs plates might be uſed for windows, as well as the lamina of lapis *ſpecularis* and *phengites*, which were improvements in luxury mentioned by Seneca, and introduced in his time, Ep. xc. However, there is no poſitive authority relating to the uſage of glaſs-windows earlier than the cloſe of the third century: *Manifeſtius eſt* (ſays Lactantius*), *mentem eſſe, quæ per oculos ea quæ ſunt oppoſita, tranſpiciat, quaſi per feneſtras lucente vitro aut ſpeculari lapide obductas.*

The firſt time we hear of glaſs made among the Romans was in the reign of Tiberius, when Pliny relates that an artiſt had his houſe demoliſhed for making glaſs malleable, or rather flexible; though Petronius Arbiter, and ſome others, aſſure us, that the emperor ordered the artiſt to be beheaded for his invention.

It appears, however, that before the conqueſt of Britain by the Romans, glaſs-houſes had been erected in the iſland, as well as in Gaul, Spain, and Italy. Hence, in many parts of the country are to be found annulets of glaſs, having a narrow perforation and thick rim, denominated by the remaining Britons *gleineu naidreedh*, or *glaſs adders*, and which were probably in former times uſed as annulets by the druids†. It can ſcarcely be queſtioned that the Britons were ſufficiently well verſed in the manufacture of glaſs, to form out of it many more uſeful inſtruments than the glaſs-beads. Hiſtory indeed aſſures us, that they did manufacture a conſiderable quantity of glaſs veſſels. Theſe, like their annulets, were moſt probably green, blue, yellow, or black, and many of them curiouſly ſtreaked with other colours. The proceſs in the manufacture would be nearly the ſame with that of the Gauls or Spaniards. The ſand of their ſhores being reduced to a ſufficient degree of fineneſs by art, was mixed with three-fourths of its weight of their nitre (much the ſame with our kelp), and both were melted together. The metal was then poured into other veſſels, where it was left to harden into a maſs, and afterwards replaced in the furnace, where it became tranſparent in the boiling, and was afterwards figured by blowing, or modelling in the lath, into ſuch veſſels as they wanted.

It is not probable that the arrival of the Romans would improve the glaſs manufacture among the Britons. The taſte of the Romans at that time was juſt the reverſe of that of the inhabitants of that iſland. The former preferred ſilver and gold to glaſs for the compoſition of their drinking veſſels. They made indeed great improvements in their own at Rome, during the government of Nero. The veſſels then formed of this metal rivalled the bowls of porcelain in their dearneſs, and equalled the cups of cryſtal in their tranſparency. But theſe were by far too coſtly for common uſe; and therefore, in all probability, were never attempted in Britain. The glaſs commonly made uſe of by the Romans was of a quality greatly inferior; and, from the fragments which have been diſcovered at the ſtations or towns of either, appear to have conſiſted of a thick, ſometimes white, but moſtly blue green, metal.

According to venerable Bede, artificers ſkilled in making *glaſs* for windows were brought over into England in the year 674, by abbot Benedict, who were employed in glazing the church and monaſtery of Weremouth. According to others, they were firſt brought

* *De opif. Dei*, cap. 5.

‡ See *Anguinum Ovum*.

over by Wilfrid, biſhop of Worceſter, about the ſame time. Till this time the art of making ſuch *glaſs* was unknown in Britain; though *glaſs* windows did not begin to be common before the year 1180: till this period they were very ſcarce in private houſes, and conſidered as a kind of luxury, and as marks of great magnificence. Italy had them firſt, next France, from whence they came into England.

Venice, for many years, excelled all Europe in the fineneſs of its *glaſſes*; and in the thirteenth century, the Venetians were the only people that had the ſecret of making cryſtal looking-*glaſſes*. The great *glaſs*-works were at Muran, or Murano, a village near the city, which furniſhed all Europe with the fineſt and largeſt *glaſſes*.

The *glaſs* manufacture was firſt begun in England in 1557: the finer ſort was made in the place called Crutched Friars, in London; the fine flint *glaſs*, little inferior to that of Venice, was firſt made in the Savoy-houſe, in the Strand, London. This manufacture appears to have been much improved in 1635, when it was carried on with ſea-coal or pit-coal inſtead of wood, and a monopoly was granted to Sir Robert Manſell, who was allowed to import the fine Venetian flint *glaſſes* for drinking, the art of making which was not brought to perfection before the reign of William III. But the firſt *glaſs*-plates, for looking *glaſſes* and coach windows, were made, 1673, at Lambeth, by the encouragement of the duke of Buckingham; who, in 1670, introduced the manufacture of fine *glaſs* into England, by means of Venetian artiſts, with amazing ſucceſs. So that within a century paſt, the French and Engliſh have not only come up to, but even ſurpaſſed the Venetians, and they are now no longer ſupplied from abroad.

The French made a conſiderable improvement in the art of *glaſs*, by the invention of a method to caſt very large plates, till then unknown, and ſcarce practiſed yet by any but themſelves and the Engliſh. That court applied itſelf with a laudable induſtry to cultivate and improve the *glaſs* manufacture. A company of *glaſs*-men was eſtabliſhed by letters patent; and it was provided by an arret, not only that the working in *glaſs* ſhould not derogate any thing from nobility, but even that none but nobles ſhould be allowed to work therein.

An extenſive manufactory of this elegant and valuable branch of commerce was firſt eſtabliſhed in Lancaſhire about the year 1773, through the ſpirited exertions of a very reſpectable body of proprietors, who were incorporated by an act of parliament. From thoſe various difficulties conſtantly attendant upon new undertakings, when they have to contend with powerful foreign eſtabliſhments, it was for ſome time conſiderably embarraſſed; but Government, of late, having taken off ſome reſtrictions that bore hard upon it, and made ſome judicious regulations relative to the mode of levying the exciſe duty, it now bids fair to rival, if not ſurpaſs, the moſt celebrated continental manufactures, both with reſpect to the quality, brilliancy, and ſize of its productions.

2
Theory of vitrification uncertain.

With regard to the theory of vitrification, we are almoſt totally in the dark. In general, it ſeems to be that ſtate in which ſolid bodies are, by the vehement action of fire, fitted for being diſſipated or carried off in vapour. In all vitrifications there is a plentiful evaporation; and if any ſolid ſubſtance is carried off in vapour by the intenſe heat of a burning ſpeculum, a vitrification is always obſerved previouſly to take place. The difference, then, between the ſtate of fuſion and vitrification of a ſolid body we may conceive to be, that in the former the element of fire acts upon the parts of the ſolid in ſuch a manner as only to disjoin them, and render the ſubſtance fluid; but in vitrification the fire not only disjoins the particles, but combines with them in a latent ſtate into a third ſubſtance; which, having now as much fire as it can contain, can receive no further change from that element except being carried off in vapour.

But though we are unable to effect this change upon ſolid bodies without a very violent heat, it is otherwiſe in the natural proceſſes. By what we call *cryſtallization*, nature produces more perfect glaſſes than we can make with our furnaces. Theſe are called *precious ſtones*; but in all trials they diſcover the eſſential properties of glaſs, and not of ſtones. The moſt diſtinguiſhing property of glaſs is its reſiſting the force of fire, ſo that this element cannot calcine or change it as it does other bodies, but can only melt it, and then carry it off in vapours. To this laſt all the precious ſtones are ſubject. The diamond (the hardeſt and moſt ponderous of them all) is diſſipable in a leſs degree of heat than what would diſſipate common glaſs. Nor can it be any objection to this idea, that ſome kinds of glaſs are capable of being converted into a kind of porcelain by a long-continued cementation with certain materials. This change happens only to thoſe kinds of glaſs which are made of alkaline ſalt and ſand; and Dr Lewis hath ſhown that this change is produced by the diſſipation of the ſaline principle, which is the leaſt fixed of the two. Glaſs, therefore, we may ſtill conſider as a ſubſtance upon which the fire has no other effect but either to melt or diſſipate it in vapour.

The other properties of glaſs are very remarkable, ſome of which follow.

3
Remarkable properties of glaſs.

1. It is one of the moſt elaſtic bodies in nature. If the force with which glaſs balls ſtrike each other be reckoned 16, that wherewith they recede by virtue of their elaſticity will be nearly 15.

4
Surpriſing fragility of annealed glaſs.

2. When glaſs is ſuddenly cooled, it becomes exceedingly brittle; and this brittleneſs is ſometimes attended with very ſurpriſing phenomena. Hollow bells made of annealed glaſs, with a ſmall hole in them, will fly to pieces by the heat of the hand only, if the hole by which the internal and external air communicate be ſtopped with a finger. Lately, however, ſome veſſels made of ſuch annealed glaſs have been diſcovered, which have the remarkable property of reſiſting very hard ſtrokes given from without, though they ſhiver to pieces by the ſhocks received from the fall of very light and minute bodies dropped into their cavities. Theſe glaſſes may be made of any ſhape; all that needs be obſerved in making them is, that their bottom be thicker than their ſides. The thicker the bottom is, the eaſier do the glaſſes break. One whoſe bottom is three fingers breadth in thickneſs, flies with as much eaſe at leaſt as the thinneſt glaſs. Some of theſe veſſels have been tried with ſtrokes of a mallet ſufficient to drive a nail into wood tolerably hard, and have held good without breaking. They have alſo

reſiſted the ſhock of ſeveral heavy bodies let fall into their cavities, from the height of two or three feet; as muſket-balls, pieces of iron, or other metal, pyrites, jaſper, wood, bone, &c. But this is not ſurpriſing, as other glaſſes of the ſame ſhape and ſize will do the ſame: but the wonder is, that taking a ſhiver of flint of the ſize of a ſmall pea, and letting it fall into the glaſs only from the height of three inches, in about two ſeconds the glaſs flies, and ſometimes at the very moment of the ſhock; nay, a bit of flint no larger than a grain, dropped into ſeveral glaſſes ſucceſſively, though it did not immediately break them, yet when ſet by, they all flew in leſs than three quarters of an hour. Some other bodies produce the ſame effect with flint; as ſapphire, diamond, porcelain, hard tempered ſteel; alſo marbles ſuch as boys play with, and likewiſe pearls.

Theſe experiments were made before the Royal Society; and ſucceeded equally when the glaſſes were held in the hand, when they were reſted on a pillow, put in water, or filled with water. It is alſo remarkable, that the glaſſes broke upon having their bottoms ſlightly rubbed with the finger, though ſome of them did not fly till half an hour after the rubbing. If the glaſſes are every where extremely thin, they do not break in theſe circumſtances.

5
Attempts to account for it.

Some have pretended to account for theſe phenomena, by ſaying, that the bodies dropped into the veſſels cauſe a concuſſion which is ſtronger than the coheſive force of the glaſs, and conſequently that a rupture muſt enſue. But why does not a ball of iron, gold, ſilver, or copper, which are perhaps a thouſand times heavier than the flint, produce the ſame effect? It is becauſe they are not elaſtic. But ſurely iron is more elaſtic than the end of one's finger.—Mr Euler has endeavoured to account for theſe appearances from his principles of percuſſion. He thinks that this experiment entirely overthrows the opinion of thoſe who meaſure the force of percuſſion by the *vis viva*, or abſolute apparent ſtrength of the ſtroke. According to his principles, the great hardneſs and angular figure of the flint, which makes the ſpace of contact with the glaſs extremely ſmall, ought to cauſe an impreſſion on the glaſs vaſtly greater than lead, or any other metal; and this may account for the flint's breaking the veſſel, though the bullet, even falling from a conſiderable height, does no damage.—Hollow cups made of green bottle-glaſs, ſome of them three inches thick at the bottom, were inſtantly broken by a ſhiver of flint, weighing about two grains, though they had reſiſted the ſhock of a muſket-ball from the height of three feet.

That Mr Euler's theory cannot be concluſive more than the other, muſt appear evident from a very ſlight conſideration. It is not by angular bodies alone that the glaſſes are broken. The marbles with which children play are round, and yet they have the ſame effect with the angular flint. Beſides, if it was the mere force of percuſſion which broke the glaſſes, undoubtedly the fracture would always take place at the very inſtant of the ſtroke; but we have ſeen, that this did not happen ſometimes till a very conſiderable ſpace of time had elapſed. It is evident, therefore, that this effect is occaſioned by the putting in motion ſome ſubtile fluid with which the ſubſtance of the glaſs is filled; and that the motions of this fluid, when once excited in a particular part of the glaſs, ſoon propagate themſelves through the whole or greateſt of it, by which means the coheſive power becomes at laſt too weak to reſiſt them. There can be little doubt that the fluid juſt now mentioned is that of electricity. It is known to exiſt in glaſs in very great quantity; and it alſo is known to be capable of breaking glaſſes, even when annealed with the greateſt care, if put into too violent a motion. Probably the cooling of glaſs haſtily may make it more electric than is conſiſtent with its coheſive power, ſo that it is broken by the leaſt increaſe of motion in the electric fluid by friction or otherwiſe. This is evidently the caſe when it is broken by rubbing with the finger; but why it ſhould alſo break by the mere contact of flint and the other bodies abovementioned, has not yet been ſatisfactorily accounted for.

6
Rotation of glaſs-tubes before a fire.

A moſt remarkable phenomenon alſo is produced in glaſs tubes placed in certain circumſtances. When theſe are laid before a fire in an horizontal poſition, having their extremities properly ſupported, they acquire a rotatory motion round their axis, and alſo a progreſſive motion towards the fire, even when their ſupports are declining from the fire, ſo that the tubes will move a little way up hill towards the fire. When the progreſſive motion of the tubes towards the fire is ſtopped by any obſtacle, their rotation ſtill continues. When the tubes are placed in a nearly upright poſture, leaning to the right hand, the motion will be from eaſt to weſt; but if they lean to the left hand, their motion will be from weſt to eaſt; and the nearer they are placed to the perfectly upright poſture, the leſs will the motion be either way.

If the tube is placed horizontally on a glaſs plane, the fragment, for inſtance, of coach-window-glaſs, inſtead of moving towards the fire, it will move from it, and about its axis in a contrary direction to what it had done before; nay, it will recede from the fire, and move a little up-hill when the plane inclines towards the fire.—Theſe experiments are recorded in the Philoſophical Tranſactions.* They ſucceeded beſt with tubes about 20 or 22 inches long, which had in each end a pretty ſtrong pin fixed in cork for an axis.

7
Attempts to account for it.

The reaſon given for theſe phenomena, is the ſwelling of the tubes towards the fire by the heat, which is known to expand all bodies. For, ſay the adopters of this hypotheſis, granting the exiſtence of ſuch a ſwelling, gravity muſt pull the tube down when ſupported near its extremities; and a freſh part being expoſed to the fire, it muſt alſo ſwell out and fall down, and ſo on.—But, without going farther in the explanation of this hypotheſis, it may be here remarked, that the fundamental principle on which it proceeds is falſe: for though fire indeed makes bodies expand, it does not increaſe them in weight; and therefore the ſides of the tube, though one of them is expanded by the fire, muſt ſtill remain *in equilibrio*; and hence we muſt conclude, that the cauſes of theſe phenomena remain yet to be diſcovered.

4. Glaſs is leſs dilatable by heat than metalline ſubſtances, and ſolid glaſs ſticks are leſs dilatable than tubes. This was firſt diſcovered by Col. Roy, in making experiments in order to reduce barometers to a greater degree of exactneſs than hath hitherto been

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* Nº 476. § 1.

Phil. Tranſ. vol. lxvii. p. 663.

found practicable; and ſince his experiments were made, one of the tubes 18 inches long, being compared with a ſolid glaſs-rod of the ſame length, the former was found by a pyrometer to expand four times as much as the other, in a heat approaching to that of boiling oil.—On account of the general quality which glaſs has of expanding leſs than metal, M. de Luc recommends it to be uſed in pendulums: and he ſays it has alſo this good quality, that its expanſions are always equable, and proportioned to the degrees of heat; a quality which is not to be found in any other ſubſtance yet known.

Ibid. vol. lxviii. p. 474.

5. Glaſs appears to be more fit for the condenſation of vapours than metallic ſubſtances. An open glaſs filled with water, in the ſummer-time, will gather drops of water on the outſide, juſt as far as the water in the inſide reaches; and a perſon's breath blown on it, manifeſtly moiſtens it. Glaſs alſo becomes moiſt with dew, when metals do not. See Dew.

6. A drinking glaſs partly filled with water, and rubbed on the brim with a wet finger, yields muſical notes, higher or lower as the glaſs is more or leſs full; and will make the liquor friſk and leap. See Harmonica.

7. Glaſs is poſſeſſed of very great electrical virtues. See Electricity, *paſſim*.

8
Materials for glaſs.

Materials for making of Glass. The materials whereof glaſs is made, we have already mentioned to be ſalt and ſand or ſtones.

1. The ſalt here uſed is procured from a ſort of aſhes brought from the Levant, called *polverine*, or *rochetta;* which aſhes are thoſe of a ſort of water-plant called *kali**, cut down in ſummer, dried in the ſun, and burnt in heaps, either on the ground, or on iron grates; the aſhes falling into a pit, grow into a hard maſs, or ſtone, fit for uſe. It may alſo be procured from common kelp, or the aſhes of the *fucus veſiculoſus*. See Kelp and Fucus.

To extract the ſalt, theſe aſhes, or polverine, are powdered and ſifted, then put into boiling water, and there kept till one third of the water be conſumed; the whole being ſtirred up from time to time, that the aſhes may incorporate with the fluid, and all its ſalts be extracted: then the veſſel is filled up with new water, and boiled over again, till one half be conſumed; what remains is a ſort of ley, ſtrongly impregnated with ſalt. This ley, boiled over again in freſh coppers, thickens in about 24 hours, and ſhoots its ſalt; which is to be ladled out, as it ſhoots, into earthen pans, and thence into wooden vats to drain and dry. This done, it is groſsly pounded, and thus put in a ſort of oven, called *calcar*, to dry. It may be added, that there are other plants, beſides kali and fucus, which yield a ſalt fit for glaſs: ſuch are the common way-thiſtle, bramble, hops, wormwood, woads, tobacco, fern, and the whole leguminous tribe, as peaſe, beans, &c.

Pearl-aſhes form a leading flux in the manufacture of glaſs, and moſtly ſupply the place of the Levant-aſhes, the barillas of Spain, and many other kinds, which were formerly brought here for making both glaſs and ſoap. See *Pearl-Aſhes*.

There are other fluxes uſed for different kinds of glaſs, and for various purpoſes, as calcined lead, nitre, ſea-ſalt, borax, arſenic, ſmiths clinkers, and wood-aſhes, containing the earth and lixiviate ſalts as produced by incineration. With regard to theſe ſeveral fluxes, we may obſerve, in general, that the more calx of lead, or other metallic earth, enters into the compoſition of any glaſs, ſo much the more fuſible, ſoft, coloured, and denſe this glaſs is, and reciprocally.

The colours given to glaſs by calxes of lead, are ſhades of yellow: on the other hand, glaſſes that contain only ſaline fluxes partake of the properties of ſalts; they are leſs heavy, leſs denſe, harder, whiter, more brilliant, and more brittle than the former; and glaſſes containing both ſaline and metallic fluxes do alſo partake of the properties of both theſe ſubſtances. Glaſſes too ſaline are eaſily ſuſceptible of alteration by the action of air and water; eſpecially thoſe in which alkalis prevail; and theſe are alſo liable to be injured by acids. Thoſe that contain too much borax and arſenic, though at firſt they appear very beautiful, quickly tarniſh and become opake when expoſed to air. By attending to theſe properties of different fluxes, phlogiſtic or ſaline, the artiſt may know how to adjuſt the proportions of theſe to ſand, or powdered flints, for the various kinds of glaſs. See the article Vitrification.

2. The ſand or ſtone, called by the artiſts *tarſo*, is the ſecond ingredient in glaſs, and that which gives it the body and firmneſs. Theſe ſtones, Agricola obſerves, muſt be ſuch as will fuſe: and of theſe ſuch as are white and tranſparent are beſt; ſo that cryſtal challenges the precedency of all others.

At Venice they chiefly uſe a ſort of pebble, found in the river Teſino, reſembling white marble, and called *cuogolo*. Indeed Ant. Neri aſſures us, that all ſtones which will ſtrike fire with ſteel, are fit to vitrify: but Dr Morret ſhows, that there are ſome exceptions from this rule. Flints are admirable; and when calcined, powdered, and ſearced, make a pure white chryſtaline metal; but the expences of preparing them makes the maſters of glaſs-houſes ſparing of their uſe. Where proper ſtones cannot be ſo conveniently had, ſand is uſed. The beſt for this purpoſe is that which is white, ſmall, and ſhining; examined by the microſcope, it appears to be ſmall fragments of rock cryſtal. For green glaſs, that which is of a ſoft texture, and more gritty; it is to be well waſhed, which is all the preparation it needs. Britiſh glaſs-houſes are furniſhed with white ſand for their cryſtal glaſſes from Lyyn in Norfolk and Maidſtone in Kent, and with the coarſer for green-glaſs from Woolwich.

Some mention a third ingredient in glaſs, viz. manganeſe, a kind of pſeudo-loadſtone, dug up in Germany, Italy, and even in Mendip hills in Somerſetſhire. But the proportion hereof to the reſt is very inconſiderable; beſide, that it is not uſed in all glaſs. Its office is to purge off the natural greeniſh colour, and give it ſome other tincture required.

For this purpoſe it ſhould be choſen of a deep colour, and free from ſpecks of a metalline appearance, or a lighter caſt; manganeſe requires to be well calcined in a hot furnace, and then to undergo a thorough levigation. The effect of manganeſe in deſtroying the colours of glaſs, and hence called the ſoap of glaſs, is accounted for by M. Montamy, in his *Traité des Couleurs pour la Peinture en Email*, in the following manner:

* See *Salſola*,

the mangancſe deſtroys the green, olive, and blue colours of glaſs, by adding to them a purple tinge, and by the mixture producing a blackiſh brown colour; and as blackneſs is cauſed merely by an abſorption of the rays of light, the blackiſh tinge given to the glaſs by the mixture of colours, prevents the reflection of ſo many rays, and thus renders the glaſs leſs coloured than before. But the black produced by this ſubſtance ſuggeſts an obvious reaſon for uſing it very ſparingly in thoſe compoſitions of glaſs which are required to be very tranſparent. Nitre or ſaltpetre is alſo uſed with the ſame intention; for by deſtroying in a certain degree the phlogiſton which gives a ſtrong tinge of yellow to glaſs prepared with lead as a flux, it ſerves to free it from this coloured tinge; and in ſaline glaſſes, nitre is requiſite in a ſmaller proportion to render them ſufficiently tranſparent, as in the caſe of looking-glaſs and other kinds of plates.

Kinds of G*LASS*. The manufactured glaſs now in uſe may be divided into three general kinds; white tranſparent glaſs, coloured glaſs, and common green or bottle glaſs. Of the firſt kind there is a great variety; as the flint glaſs, as it is called with us; and the German cryſtal glaſs, which are applied to the ſame uſes; the glaſs for plates for mirrors or looking-glaſſes; the glaſs for windows and other lights; and the glaſs for phials and ſmall veſſels. And theſe again differ in the ſubſtances employed as fluxes in forming them, as well as in the coarſeneſs or fineneſs of ſuch as are uſed for their body. The flint and cryſtal, mirror and beſt window glaſs, not only require ſuch purity in the fluxes, as may render it practicable to free the glaſs perfectly from all colour; but for the ſame reaſon likewiſe, either the white Lynn ſand, calcined flints, or white pebbles, ſhould be uſed. The others do not demand the ſame nicety in the choice of the materials; though the ſecond kind of window glaſs, and the beſt kind of phial, will not be ſo clear as they ought, if either too brown ſand, or impure ſalts, be ſuffered to enter into their compoſition.

Of coloured glaſs there is a great variety of ſorts, differing in their colour or other properties according to the occaſions for which they are wanted. The differences in the latter kind depend on the accidental preparation and management of the artiſts by whom they are manufactured, as will be afterwards explained.

Furnace for the making of G*LASS*. In this manufacture there are three ſorts of furnaces; one called *calcar* is for the frit; the ſecond is for working the glaſs; the third ſerves to anneal the glaſs, and is called the *leer*. See Plate CCXX.

The calcar reſembles an oven ten feet long, ſeven feet broad, and two deep: the fuel, which in Britain is ſea-coal, is put into a trench on one ſide of the furnace; and the flame reverberating from the roof upon the frit calcines it. The glaſs-furnace, or working-furnace, is round, of three yards diameter, and two high; or thus proportioned. It is divided into three parts, each of which is vaulted. The lower part is propely called the *crown*, and is made in that form. Its uſe is to keep a briſk fire, which is never put out. The mouth is called *bocca*. There are ſeveral holes in the arch of this crown, through which the flame paſſes into the ſecond vault or partition; and reverberates into the ports filled with the ingredients above-mentioned. Round the inſides are eight or more pots placed, and piling pots on them. The number of pots is always double that of the boccas or mouths, or of the number of workmen, that each may have one pot refined to work out of, and another for metal to refine in while he works out of the other. Through the working holes the metal is taken out of the pots; and the pots are put into the furnace; and theſe holes are ſtopped with moveable covers made of lute and brick, to ſcreen the workmen's eyes from the ſcorching flames. On each ſide of the bocca or mouth is a bocarella or little hole out of which coloured glaſs or finer metal is taken from the piling pot. Above this oven there is the third oven or *leer*, about five or ſix yards long, where the veſſels or glaſs are annealed or cooled; this part conſiſts of a tower, beſides the leer; into which the flame aſcends from the furnace. The tower has two mouths, through which the glaſſes are put in with a fork, and ſet on the floor or bottom: but they are drawn out on iron pans, called *fraches*, through the leer, to cool by degrees: ſo that they are quite cold by the time they reach the mouth of the leer, which enters the ſaroſel or room where the glaſſes are to be ſtowed.

But the green glaſs-furnace is ſquare: and at each angle it has an arch for annealing or cooling glaſſes. The metal is wrought on two oppoſite ſides, and on the other two they have their colours, into which are made linnet holes for the fire to come from the furnace to bake the frit, and to diſcharge the ſmoke. Fires are made in the arches to anneal the work, ſo that the whole proceſs is done in one furnace.

Theſe furnaces muſt not be of brick, but of hard ſandy ſtones. In France, they build the outſide of brick; and the inner part, to bear the fire, is made of a ſort of Fuller's earth, or tobaccoe-pipe clay, of which earth they alſo make their melting pots. In Britain the pots are made of Sturbridge-clay.

Mr Blancourt obſerves, that the worſt and rougheſt work in this art is the changing the pots when they are worn out or cracked. In this caſe, the great working hole muſt be uncovered; the faulty pot muſt be taken out with iron hooks and forks, and a new one muſt be ſpeedily put in its place, through the flames, by the hands only. For this work, the man guards himſelf with a garment made of ſkins; in the ſhape of a pantaloon, that covers him all but his eyes, and is made as wet as poſſible: the eyes are defended with a proper ſort of glaſs.

Inſtruments for making of G*LASS*. The inſtruments made uſe of in this work, may be reduced to theſe that follow. A blowing-pipe, made of iron, about two feet and a half long, with a wooden handle. An iron rod to take up the glaſs after it is blown, and to cut off the former. Sciſſars to cut the glaſs when it comes off from the firſt hollow iron. Shears to cut and ſhape great glaſſes, &c. An iron-ladle, with the end of the handle caſed with wood, to take the metal out of the refining pot, to put it into the workmen's pots. A ſmall iron-ladle, caſed in the ſame manner, to ſkim the alkalic ſalt that ſwims at top. Shovels, one like a peel, to take up the great glaſſes; another, like a fire-ſhovel, to feed the furnace with coals. A hooked iron fork, to ſtir the matter in the pots. An iron rake for the ſame purpoſe, and to ſtir the frit. An iron fork, to change or pull the pots out of the furnace, &c.

Compoſitions for White and Cryſtal GLASS. 1. To make *cryſtal glaſs*, take of the whiteſt tarſo, pounded ſmall, and ſearced as fine as flour, 200 pounds; of the ſalt of polverine 130 pounds; mix them together, and put them into the furnace called the *calcar*, firſt heating it. For an hour keep a moderate fire, and keep ſtirring the materials with a proper rake; that they may incorporate and calcine together; then increaſe the fire for five hours; after which take out the matter; which being now ſufficiently calcined, is called *frit*. From the calcar put the frit in a dry place, and cover it up from the duſt for three or four months. Now to make the glaſs or cryſtal: take of this cryſtal frit, called alſo *bollito*; ſet it in pots in the furnace, adding to it a due quantity of magneſia or manganeſe: when the two are fuſed, caſt the fluor into fair water, to clear it of the ſalt called *ſandiver*; which would otherwiſe make the cryſtal obſcure and cloudy. This lotion muſt be repeated again and again, as often as needful, till the cryſtal be fully purged; or this ſcum may be taken off by means of proper ladles. Then ſet it to boil four, five, or ſix days; which done, ſee whether it have manganeſe enough; and if it be yet greeniſh, add more manganeſe, at diſcretion, by little and little at a time, taking care not to overdoſe it, becauſe the manganeſe inclines it to a blackiſh hue. Then let the metal clarify, till it becomes of a clear and ſhining colour; which done, it is fit to be blown or formed into veſſels at pleaſure.

2. *Flint glaſs*, as it is called by us, is of the ſame general kind with that which in other places is called cryſtal glaſs. It has this name from being originally made with calcined flints, before the uſe of the white ſand was underſtood; and retains the name, though no flints are now uſed in the compoſition of it. This flint glaſs differs from the other, in having lead for its flux, and white ſand for its body; whereas the fluxes uſed for the cryſtal glaſs are ſalts or arſenic, and the body conſiſts of calcined flints or white river pebbles, tarſo, or ſuch ſtones. To the white ſand and lead a proper proportion of nitre is added, to burn away the phlogiſton of the lead, and alſo a ſmall quantity of magneſia; and in ſome works they uſe a proportional quantity of arſenic to aid the fluxing ingredients. The moſt perfect kind of flint glaſs may be made by fuſing with a very ſtrong fire 120 pounds of the white ſand, 50 pounds of red lead, 40 pounds of the beſt pearl-aſhes, 20 pounds of nitre, and five ounces of magneſia. Another compoſition of flint glaſs, which is ſaid to come nearer to the kind now made, is the following: 120 pounds of ſand, 54 pounds of the beſt pearl-aſhes, 36 pounds of red-lead, 12 pounds of nitre, and 6 ounces of magneſia. To either of theſe a pound or two of arſenic may be added, to increaſe the flux of the compoſition. A cheaper compoſition of flint glaſs may be made with 120 pounds of white ſand, 35 pounds of the beſt pearl-aſhes, 40 pounds of red-lead, 13 pounds of nitre, 6 pounds of arſenic, and 4 ounces of magneſia; or inſtead of the arſenic may be ſubſtituted 15 pounds of common ſalt; but this will be more brittle than the other. The cheapeſt compoſition for the worſt kind of flint glaſs conſiſts of 120 pounds of white ſand, 30 pounds of red-lead, 20 pounds of the beſt pearl-aſhes, 10 pounds of nitre, 15 pounds of common ſalt, and ſix pounds of arſenic. The beſt German cryſtal glaſs is made of 120 pounds of calcined flints or white ſand, 70 pound of the beſt pearl-aſhes, 10 pounds of ſaltpetre, half a pound of arſenic, and five ounces of magneſia. And a cheaper compoſition is formed of 120 pounds of calcined flints or white ſand, 46 pounds of pearl-aſhes, 7 pounds of nitre, 6 pounds of arſenic, and 5 ounces of magneſia.

A glaſs much harder than any prepared in the common way, may be made by means of borax in the following method: Take four ounces of borax, and an ounce of fine ſand; reduce both to a ſubtile powder, and melt them together in a large cloſe crucible ſet in a wind furnace, keeping up a ſtrong fire for half an hour; then take out the crucible, and when cold break it, and there will be found at the bottom a pure hard glaſs capable of cutting common glaſs like a diamond. This experiment, duly varied, ſays Dr Shaw, may lead to ſeveral uſeful improvements in the arts of glaſs, enamels, and factitious gems, and ſhows an expeditious method of making glaſs, without any fixed alkali, which has been generally thought an eſſential ingredient in glaſs, and it is not yet known whether calcined cryſtal or other ſubſtances being added to this ſalt inſtead of ſand, it might not make a glaſs approaching to the nature of a diamond.

There are three principal kinds of glaſſes, diſtinguiſhed by the form or manner of working them; viz. I. *Round glaſs*, as thoſe of our veſſels, phials, drinking-glaſſes, &c. II. *Table* or *window-glaſs*, of which there are divers kinds; viz. crown-glaſs, jealous-glaſs, &c. III. *Plate-glaſs*, or *mirror glaſs*.

I. *Working or Blowing Round* GLASS. The working furnace, we have obſerved, is round, and has ſix boccas or apertures: at one of theſe called the *great bocca*, the furnace is heated, and the pots of frit are at this ſet in the furnace; two other ſmaller holes, called *bocarellas*, ſerve to lade or take out the melted metal, at the end of an iron, to work the glaſs. At the other holes they put in pots of fuſible ingredients, to be prepared, and at laſt emptied into the lading-pot.

There are ſix pots in each furnace, all made of tobacco-pipe clay, proper to ſuſtain not only the heat of the fire, but alſo the effect of the polverine, which penetrates every thing elſe. There are only two of theſe pots that work: the reſt ſerve to prepare the matter for them. The fire of the furnace is made and kept up with dry hard wood, caſt in without intermiſſion at ſix apertures.

When the matter contained in the two pots is ſufficiently vitrified, they proceed to blow or faſhion it. For this purpoſe the workman dips his blowing pipe into the melting-pot; and by turning it about, the metal ſticks to the iron more firmly than turpentine. This he repeats four times, at each time rolling the end of his inſtrument with the hot metal thereon, on a piece of plate-iron; over which is a veſſel of water which helps to cool, and ſo to conſolidate and to diſpoſe that matter to bind more firmly with what is to be taken next out of the melting pot. But after he has dipt a fourth time, and the workman perceives there is metal enough on the pipe, he claps his mouth immediately to the other end of it, and blows gently through the iron tube, till the metal lengthens like a bladder about a foot. Then he rolls it on a marble ſtone a little while to poliſh it; and blows a ſecond time, by which he brings it to the ſhape of a globe of about 18 or 20 inches diameter. Every time he blows into the pipe, he removes it quickly to his cheek; otherwiſe he would be in danger, by often blowing, of drawing the flame into his mouth: and this globe may be flattened by returning it to the fire; and brought into any form by ſtamp-irons, which are always ready. When the glaſs is thus blown, it is cut off at the collet or neck; which is the narrow part that ſtuck to the iron. The method of performing this is as follows: the pipe is reſted on an iron bar, cloſe by the collet; then a drop of cold water being laid on the collet, it will crack about a quarter of an inch, which, with a ſlight blow or cut of the ſhears, will immediately ſeparate the collet.

After this is done, the operator dips the iron rod into the melting-pot, by which he extracts as much metal as ſerves to attract the glaſs he has made, to which he now fixes this rod at the bottom of his work, oppoſite to the opening made by the breaking of the collet. In this poſition the glaſs is carried to the great bocca or mouth of the oven, to be heated and ſcalded; by which means it is again put into ſuch a ſoft ſtate, that, by the help of an iron inſtrument, it can be pierced, opened, and widened, without breaking. But the veſſel is not finiſhed till it is returned to the great bocca; where being again heated thorougly, and turned quickly about with a circular motion, it will open to any ſize, by the means of the heat and motion.

If there remain any ſuperfluities, they are cut off with the ſhears; for till the glaſs is cold, it remains in a ſoft flexible ſtate. It is therefore taken from the bocca, and carried to an earthern bench, covered with brands, which are coals extinguiſhed, keeping it turning; becauſe that motion prevents any ſettling, and preſerves an evenneſs in the face of the glaſs, where, as it cools, it comes to its conſiſtency; being firſt cleared from the iron rod by a ſlight ſtroke by the hand of the workman.

If the veſſel conceived in the workman's mind, and whoſe body is already made, requires a foot, or a handle, or any other member or decoration, he makes them ſeparately; and now eſſays to join them with the help of hot metal, which he takes out of the pots with his iron-rod: but the glaſs is not brought to its true hardneſs till it has paſſed the leer or annealing oven, deſcribed before.

II. *Working or Blowing of Window or Table Glass.* The method of working round glaſs, or veſſels of any ſort, is in every particular applicable to the working of window or table glaſs, till the blowing iron has been dipt the fourth time. But then inſtead of rounding it, the workman blows, and ſo manages the metal upon the iron plate, that it extends two or three feet in the form of a cylinder. The cylinder is put again to the fire, and blown a ſecond time, and is thus repeated till it is extended to the dimenſions required, the ſide to which the pipe is fixed diminiſhing gradually till it ends in a pyramidal form; ſo that, to bring both ends nearly to the ſame diameter, while the glaſs is thus flexible, he adds a little hot metal to the end oppoſite the pipe, and draws it out with a pair of iron pincers, and immediately cuts off the ſame end with the help of a little cold water as before.

The cylinder being now open at one end, is carried back to the bocca; and there, by the help of cold water, it is cut about eight or ten inches from the iron pipe or rod; and the whole length at another place, by which alſo it is cut off from the iron rod. Then it is heated gradually on an earthen table, by which it opens in length; while the workman, with an iron tool, alternately lowers and raiſes the two halves of the cylinder; which at laſt will open like a ſheet of paper, and fall into the ſame flat form in which it ſerves for uſe; in which it is preſerved by heating it over again, cooling it on a table of copper, and hardening it 24 hours in the annealing furnace, to which it is carried upon forks. In this furnace an hundred tables of glaſs may lie at a time, without injury to each other, by ſeparating them into tens, with an iron ſhiver between, which diminiſhes the weight by dividing it, and keeps the tables flat and even.

Of window or table glaſs there are various ſorts, made in different places, for the uſe of building. Thoſe moſt known among us are given us by the author of the Builder's Dictionary, as follows:

1. *Crown*, of which, ſays Neri, there are two kinds, diſtinguiſhed by the places where they are wrought; viz. Ratcliff crown glaſs, which is the beſt and cleareſt, and was firſt made at the Bear-garden, on the Bankſide, Southwark, but ſince at Ratcliff: of this there are 24 tables to the caſe, the tables being of a circular form, about three feet ſix inches in diameter. The other kind, or Lambeth crown glaſs, is of a darker colour than the former, and more inclining to green.

The beſt window or crown glaſs, is made of white ſand 90 pounds, of purified pearl aſhes 30 pounds, of ſaltpetre 15 pounds, of borax one pound, and of arſenic half a pound. If the glaſs ſhould prove yellow, magneſia muſt be added. A cheaper compoſition for window glaſs conſiſts of 60 pounds of white ſand, 15 pounds of unpurified pearl-aſhes, 10 pounds of common ſalt, 5 pounds of nitre, 2 pounds of arſenic, and one ounce and a half of magneſia. The common or green window glaſs is compoſed of 60 pounds of white ſand, 30 pounds of unpurified pearl aſhes, 10 pounds of common ſalt, 2 pounds of arſenic, and two ounces of magneſia. But a cheaper compoſition for this purpoſe conſiſts of 120 pounds of the cheapeſt white ſand, 30 pounds of unpurified pearl-aſhes, 60 pounds of wood aſhes, well burnt and ſifted, 20 pounds of common ſalt, and five pounds of arſenic.

2. *French glaſs*, called alſo *Normandy glaſs*, and formerly *Lorrain glaſs*, becauſe made in thoſe provinces. At preſent it is made wholly in the nine glaſs-works; five whereof are in the foreſt of Lyons, four in the county of Eu; the laſt at Beaumont near Rouen. It is of a thinner kind than our crown glaſs; and when laid on a piece of white paper, appears of a dirtyiſh green colour. There are but 25 tables of this to the caſe.

3. *German glaſs*, is of two kinds, the *white* and the *green*: the firſt is of a whitiſh colour, but is ſubject to thoſe ſmall curved ſtreaks obſerved in the Newcaſtle glaſs, though free from the ſpots and blemiſhes thereof. The green, beſides its colour, is liable to the ſame

GLASS.

Plate CCXX.

Fig. 1. Blowing.

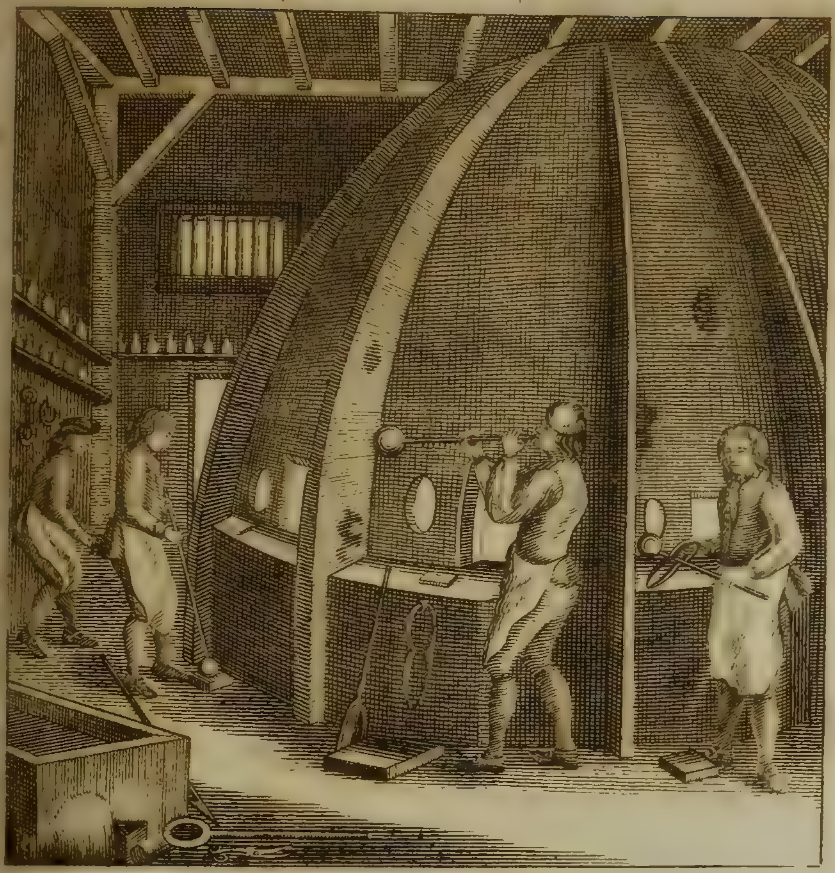


Fig. 2. Casting.

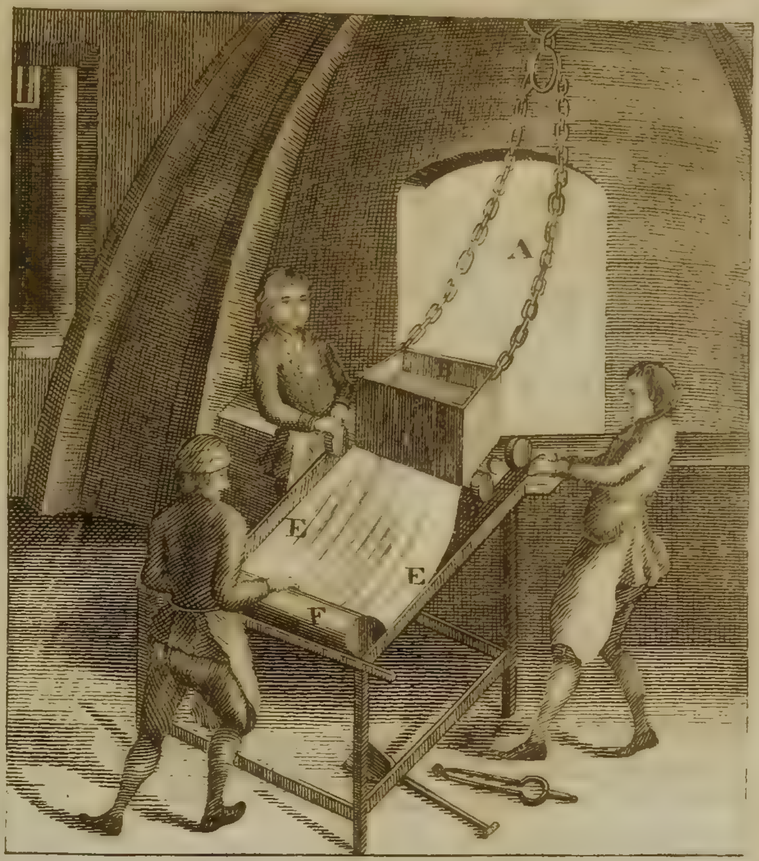
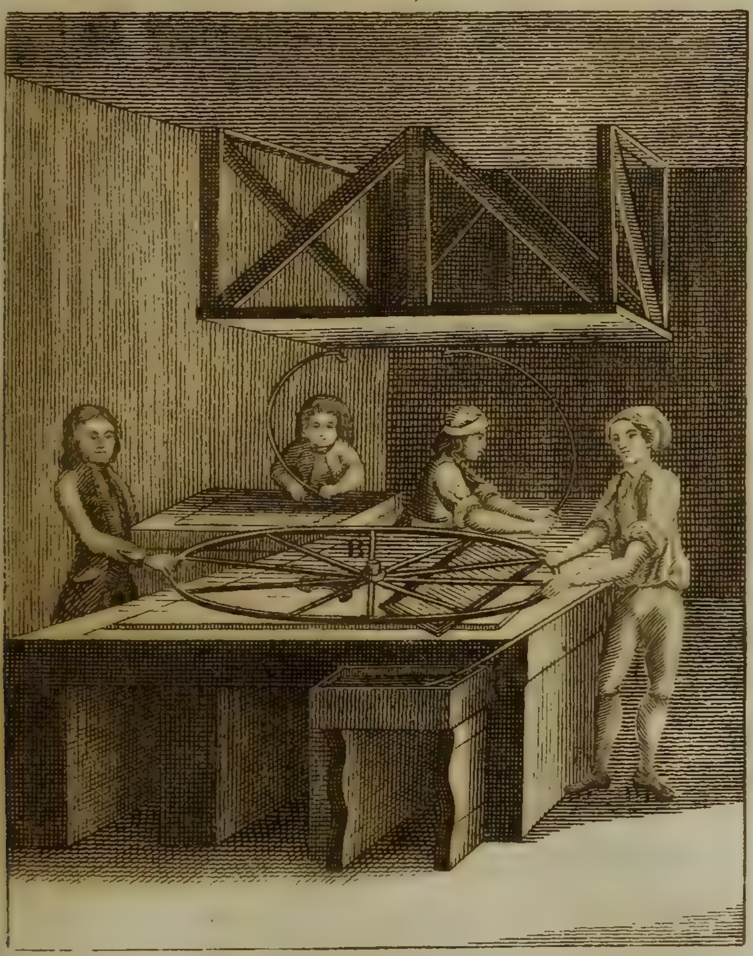


Fig. 3. Polishing.



Furnace for Artificial GEMS.

Fig. 7.

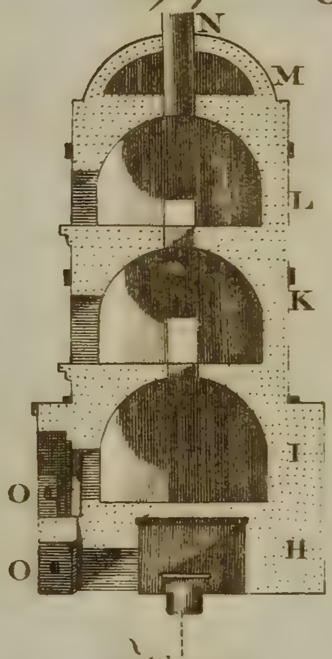


Fig. 6.

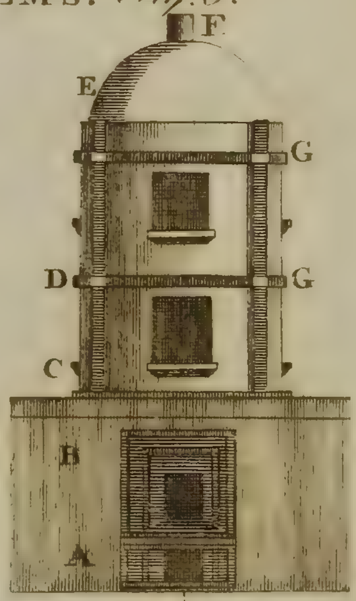


Fig. 4.

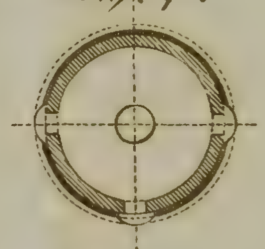
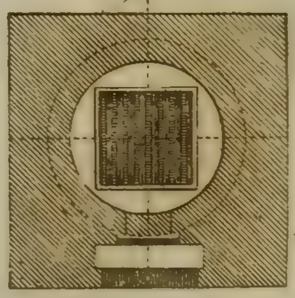


Fig. 5.



ſtreaks as the white; but both of them are ſtraighter and leſs warped than the Newcaſtle glaſs.

4. *Dutch glaſs* is not much unlike the Newcaſtle glaſs either in colour or price. It is frequently much warped like that, and the tables are but ſmall.

5. *Newcaſtle glaſs* is that moſt uſed in England. It is of an aſh-colour, and much ſubject to ſpecks, ſtreaks, and other blemiſhes; and beſides is frequently warped. Leybourn ſays, there are 45 tables to the caſe, each containing five ſuperficial feet: ſome ſay there are but 35 tables, and ſix feet in each table.

6. *Phial glaſs* is a kind betwixt the flint glaſs and the common bottle or green glaſs. The beſt kind may be prepared with 120 pounds of white ſand, 50 pound of unpurified pearl-aſhes, 10 pounds of common ſalt, 5 pounds of arſenic, and 5 ounces of magneſia. The compoſition for green or common phial glaſs conſiſts of 120 pounds of the cheapeſt white ſand, 80 pounds of wood aſhes well burnt and ſifted, 20 pounds of pearl-aſhes, 15 pounds of common ſalt, and 1 pound of arſenic.

The common bottle or green is formed of ſand of any kind fluxed by the aſhes of burnt wood, or of any parts of vegetables; to which may be added the *ſcoriæ* or clinkers of forges. When the ſofteſt ſand is uſed, 200 pounds of wood aſhes will ſuffice for 100 pounds of ſand, which are to be ground and mixed together. The compoſition with the clinkers conſiſts of 170 pounds of wood-aſhes, 100 pounds of ſand, and 50 pounds of clinkers or *ſcoriæ*, which are to be ground and mixed together. If the clinkers cannot be ground, they muſt be broke into ſmall pieces, and mixed with the other matter without any grinding.

III. *Working of Plate or Mirror* GLASS. 1. The materials of which this glaſs is made are much the ſame as thoſe of other works of glaſs, viz. an alkali as ſalt and ſand.

The ſalt, however, ſhould not be that extracted from polverine or the aſhes of the Syrian kali, but that from BARILLA, growing about Alicant in Spain. It is very rare that we can have the barilla pure; the Spaniards in burning the herb make a practice of mixing another herb along with it, which alters its quality; or of adding ſand to it to increaſe the weight, which is eaſily diſcovered if the addition be only made after the boiling of the aſhes, but next to impoſſible if made in the boiling. It is from this adulteration that thoſe threads and other defects in plate glaſs ariſe. To prepare the ſalt, they clean it well of all foreign matters; pound or grind it with a kind of mill, and finally ſift it pretty fine.

Pearl-aſhes, properly purified, will furniſh the alkali ſalt requiſite for this purpoſe; but it will be neceſſary to add borax or common ſalt, in order to facilitate the fuſion, and prevent the glaſs from ſtiffening in that degree of heat in which it is to be wrought into plates. For purifying the pearl-aſhes, diſſolve them in four times their weight of boiling water, in a pot of caſt iron, always kept clean from ruſt. Let the ſolution be removed into a clean tub, and remain there 24 hours or longer. Having decanted the clear part of the fluid from the dregs or ſediment, put it again in the iron pot, and evaporate the water till the ſalts are left perfectly dry. Preſerve them in ſtone-jars, well ſecured from air and moiſture.

Pearl-aſhes may alſo be purified in the higheſt degree, ſo as to be proper for the manufacture of the moſt tranſparent glaſs, by pulverizing three pounds of the beſt pearl-aſhes with ſix ounces of ſaltpetre in a glaſs of marble mortar, till they are well mixed; and then putting part of the mixture into a large crucible, and expoſing it in a furnace to a ſtrong heat. When this is red-hot, throw in the reſt gradually; and when the whole is red-hot, pour it out on a moiſtened ſtone or marble, and put it into an earthen or clean iron pot, with ten pints of water; heat it over the fire till the ſalts be entirely melted; let it then ſtand to cool, and filter it through paper in a pewter cullender. When it is filtered, put the fluid again into the pot, and evaporate the ſalt to dryneſs, which will then be as white as ſnow; the nitre having burnt all the phlogiſtic matter that remained in the pearl-aſhes after their former calcination.

As to the ſand, it is to be ſifted and waſhed till ſuch time as the water come off very clear; and when it is well dried again, they mix it with the ſalt, paſſing the mixture through another ſieve. This done, they lay them in the annealing furnace for about two hours; in which time the matter becomes very light and white: in this ſtate they are called *frit* or *fritta*; and are to be laid up in a dry clean place, to give them time to incorporate: they lie here for at leaſt a year.

When they would employ this frit, they lay it for ſome hours in the furnace, adding to it ſome the fragments or ſhards of old and ill made glaſſes; taking care firſt to calcine the ſhards by heating them red-hot in the furnace, and thus caſting them into cold water. To the mixture muſt likewiſe be added manganeſe, to promote the fuſion and purification.

The beſt compoſition for looking-glaſs plates conſiſts of 60 pounds of white ſand cleanſed, 25 pounds of purified pearl-aſhes, 15 pounds of ſaltpetre, and 7 pounds of borax. If a yellow tinge ſhould affect the glaſs, a ſmall proportion of magneſia, mixed with an equal quantity of arſenic, ſhould be added. An ounce of the magneſia may be firſt tried; and if this proves inſufficient, the quantity ſhould be increaſed.

A cheaper compoſition for looking-glaſs plates conſiſts of 60 pounds of the white ſand, 20 pounds of pearl-aſhes, 10 pounds of common ſalt, 7 pounds of nitre, 2 pounds of arſenic, and 1 pound of borax. The matter of which the glaſſes are made at the famous manufacture of St Gobin in France, is a compoſition of ſolder and of a very white ſand, which are carefully cleaned of all heterogeneous bodies; afterwards waſhed for ſeveral times, and dried ſo as to be pulverized in a mill, conſiſting of many peſtles, which are moved by horſes. When this is done, the ſand is ſifted through ſilk ſieves and dried.

The matter thus far prepared is equally fit for plate-glaſs, to be formed either for blowing or by caſting.

The largeſt glaſſes at St Gobin are run; the middle-ſized and ſmall ones are blown.

2. *Blowing the Plates.* The workhouſes, furnaces, &c. uſed in the making of this kind of plate-glaſs, are the ſame, except that they are ſmaller, and that the carquaiſſes are diſpoſed in a large covered gallery, over againſt the furnace, as thoſe in the following article, to which the reader is referred.

After the materials are vitrified by the heat of the fire, and the glaſs is ſufficiently refined, the workman dips in his blowing-iron, ſix feet long, and two inches in diameter, ſharpened at the end which is put in the mouth, and widened at the other, that the matter may adhere to it. By this means he takes up a ſmall ball of matter, which ſticks to the end of the tube by conſtantly turning it. He then blows into the tube, that the air may ſwell the annexed ball; and carrying it over a bucket of water, which is placed on a ſupport at the height of about four feet, he ſprinkles the end of the tube to which the matter adheres, with water, ſtill turning it, that by this cooling the matter may coaleſce with the tube, and be fit for ſuſtaining a greater weight. He dips the tube again into the ſame pot, and proceeds as before; and dipping it in the pot a third time, he takes it out, loaded with matter, in the ſhape of a pear, about ten inches in diameter, and a foot long, and cools it at the bucket; at the ſame time blowing into the tube, and with the aſſiſtance of a labourer, giving it a balancing motion, he cauſes the matter to lengthen; which, by repeating this operation ſeveral times, aſſumes the form of a cylinder, terminating like a ball at the bottom, and in a point at the top. The aſſiſtant is then placed on a ſtool three feet and a half high; and on this ſtool there are two upright pieces of timber, with a croſs beam of the ſame, for ſupporting the glaſs and tube, which are kept in an oblique poſition by the aſſiſtant, that the maſter workman may with a punchion ſet in a wooden handle, and with a mallet make a hole in the maſs: this hole is drilled at the centre of the ball that terminates the cylinder, and is about an inch in diameter. When the glaſs is pierced, the defects of it are perceived; if it is tolerably perfect, the workman lays the tube horizontally on a little iron treſſel, placed on the ſupport of the aperture of the furnace. Having expoſed it to the heat for about a half a quarter of an hour, he takes it away, and with a pair of long and broad ſhears, extremely ſharp at the end, widens the glaſs, by inſinuating the ſhears into the hole made with the punchion, whilſt the aſſiſtant, mounted on the ſtool, turns it round, till at laſt the opening is ſo large as to make a perfect cylinder at bottom. When this is done, the workman lays his glaſs upon the treſſels at the mouth of the furnace to heat it: he then gives it to his aſſiſtant on the ſtool, and with large ſhears cuts the maſs of matter up to half its height. There is at the mouth of the furnace an iron tool called *pontil*, which is now heating, that it may unite and coaleſce with the glaſs juſt cut, and perform the office which the tube did before it was ſeparated from the glaſs. This pontil is a piece of iron ſix feet long, and in the form of a cane or tube, having at the end of it a ſmall iron bar, a foot long, laid equally upon the long one, and making with it a T. This little bar is full of the matter of the glaſs, about four inches thick. This red hot pontil is preſented to the diameter of the glaſs, which coaleſees immediately with the matter round the pontil, ſo as to ſupport the glaſs for the following operation. When this is done, they ſeparate the tube from the glaſs, by ſtriking a few blows with a chiſſel upon the end of the tube which has been cooled; ſo that the glaſs breaks directly, and makes this ſeparation, the tube being diſcharged of the glaſs now adhering to the pontil. They next preſent to the furnace the pontil of the glaſs, laying it on the treſſel to heat, and redden the end of that glaſs, that the workman may open it with his ſhears, as he has already opened one end of it, to complete the cylinder; the aſſiſtant holding it on his ſtool as before. For the laſt time, they put the pontil on the treſſel, that the glaſs may become red-hot, and the workman cuts it quite open with his ſhears, right over-againſt the forementioned cut; this he does as before, taking care that both cuts are in the ſame line. In the mean time, the man who looks after the carquaiſſes comes to receive the glaſs upon an iron ſhovel two feet and a half long without the handle, and two feet wide, with a ſmall border of an inch and a half to the right and left, and towards the handle of the ſhovel. Upon this the glaſs is laid, flattening it a little with a ſmall ſtick a foot and a half long, ſo that the cut of the glaſs is turned upwards. They ſeparate the glaſs from the pontil, by ſtriking a few gentle blows between the two with a chiſſel. The glaſs is then removed to the mouth of the hot carquaiſſe, where it becomes red-hot gradually; the workman, with an iron tool ſix feet long, and widened at the end in form of a club at cards four inches long, and two inches wide on each ſide, very flat, and not half an inch thick, gradually lifts up the cut part of the glaſs to unfold it out of its form of a flattened cylinder, and render it ſmooth, by turning it down upon the hearth of the carquaiſſe. The tool already deſcribed being inſinuated within the cylinder, performs this operation by being puſhed hard againſt all the parts of the glaſs. When the glaſs is thus made quite ſmooth, it is puſhed to the bottom of the carquaiſſe or annealing furnace with a ſmall iron raker, and ranged there with a little iron hook. When the carquaiſſe is full, it is ſtopped and cemented as in the caſe of run glaſſes, and the glaſs remains there for a fortnight to be annealed; after which time they are taken out to be poliſhed. A workman can make but one glaſs in an hour, and he works and reſts for ſix hours alternately.

Such was the method formerly made uſe of for blowing plate-glaſs, looking-glaſſes, &c.; but the workmen, by this method, could never exceed 50 inches in length, and a proportional breadth, becauſe what were larger were always found to warp, which prevented them from reflecting the objects regularly, and wanted ſubſtance to bear the neceſſary grinding. Theſe imperfections have been remedied by the following invention of the Sieur Abraham Thevart, in France, about the year 1688.

Plate CCXX.

3. *Caſting or Running of Large Mirror-Glass Plates.* The furnace is of a very large dimenſion, environed with ſeveral ovens, or annealing furnaces, called *carquaiſſes*, beſides others for making of frit and calcining old pieces of glaſs. This furnace, before it is fit to run glaſs, coſts 3500l. It ſeldom laſts above three years, and even in that time it muſt be refitted every ſix months. It takes ſix months to rebuild it, and three months to refit it. The melting pots are as big as large hogſheads, and contain about 2000 weight of metal. If one of them burſts in the furnace, the loſs of the matter and time amounts to 250l. The materials in theſe pots are the ſame as deſcribed before. When the furnace is red-hot, theſe materials are put in at three different

times, becauſe that helps the fuſion ; and in 24 hours they are vitrified, refined, ſettled, and fit for caſting. A is the bocca, or mouth of the furnace ; B is the ciſtern that conveys the liquid glaſs it receives out of the melting pots in the furnace to the caſting table. Theſe ciſterns are filled in the furnace, and remain therein ſix hours after they are filled; and then are hooked out by the means of a large iron chain, guided by a pully placed upon a carriage with four wheels marked C, by two men. This carriage has no middle-piece ; ſo that when it has brought the ciſtern to the caſting-table D, they ſlip off the bottom of the ciſtern, and out ruſhes a torrent of flaming matter upon the table : this matter is confined to certain dimenſions by the iron rulers EE, which are moveable, retain the fluid matter, and determine the width of the glaſs ; while a man, with the roller F reſting on the edge of the iron rulers, reduceth it as it cools to an equal thickneſs, which is done in the ſpace of a minute. This table is ſupported on a wooden frame, with truſtles for the convenience of moving to the annealing furnace ; into which, ſtrewed with ſand, the new plate is ſhoved, where it will harden in about 10 days.

What is moſt ſurpriſing throughout the whole of this operation, is the quickneſs and addreſs wherewith ſuch maſſy ciſterns, filled with a flaming matter, are taken out of the furnace, conveyed to the table, and poured therein, the glaſs ſpread, &c. The whole is inconceivable to ſuch as have not been eye-witneſſes of that ſurpriſing manufacture.

As faſt as the ciſterns are emptied, they carry them back to the furnace and take freſh ones, which they empty as before. This they continue to do ſo long as there are any full ciſterns ; laying as many plates in each carquaiſſe as it will hold, and ſtopping them up with doors of baked earth, and every chink with cement, as ſoon as they are full, to let them anneal and cool again, which requires about 14 days.

The firſt running being diſpatched, they prepare another, by filling the ciſterns anew from the matter in the pots ; and after the ſecond, a third ; and even a fourth time, till the melting-pots are quite empty.

The ciſterns at each running ſhould remain at leaſt ſix hours in the furnace to whiten; and when the firſt annealing furnace is full, the caſting-table is to be carried to another. It need not here be obſerved, that the carquaiſſes, or annealing furnaces, muſt firſt have been heated to the degree proper for them. It may be obſerved, that the oven-full, or the quantity of matter commonly prepared, ſupplies the running of 18 glaſſes, which is performed in 18 hours, being an hour for each glaſs. The workmen work ſix hours, and are then relieved by others.

When the pots are emptied, they take them out, as well as the ciſterns, to ſcrape off what glaſs remains, which otherwiſe would grow green by continuance of fire, and ſpoil the glaſſes. They are not filled again in leſs than 36 hours, ſo that they put the matter into the furnace, and begin to run it every 54 hours.

The manner of heating the large furnaces is very ſingular : the two tiſors, or perſons employed for that purpoſe, in their ſhirts, run ſwiftly round the furnace without making the leaſt ſtop: as they run along, they take two billets, or pieces of wood, which are cut for the purpoſe ; theſe they throw into the firſt tiſſart ; and continuing their courſe, do the ſame for the ſecond. This they hold without interruption for ſix hours ſucceſſively; after which they are relieved by others, &c. It is ſurpriſing that two ſuch ſmall pieces of wood, and which are conſumed in an inſtant, ſhould keep the furnace to the proper degree of heat; which is ſuch, that a large bar of iron, laid at one of the mouths of the furnace, becomes red-hot in leſs than half a minute.

The glaſs, when taken out of the melting-furnace, needs nothing farther but to be ground, poliſhed, and foliated.

4. *Grinding and Poliſhing of Plate-*G*LASS.* Glaſs is made tranſparent by fire ; but it receives its luſtre by the ſkill and labour of the grinder and poliſher ; the former of whom takes it rough out of the hands of the maker.

In order to grind plate-glaſs, they lay it horizontally upon a flat ſtone table made of a very fine-grained free-ſtone ; and for its greater ſecurity they plaſter it down with lime or ſtucco; for otherwiſe the force of the workmen, or the motion of the wheel with which they grind it, would move it about.

This ſtone table is ſupported by a ſtrong frame A, made of wood, with a ledge quite round its edges, riſing about two inches higher than the glaſs. Upon this glaſs to be ground is laid another rough glaſs not above half ſo big, and ſo looſe as to ſlide upon it ; but cemented to a wooden plank, to guard it from the injury it muſt otherwiſe receive from the ſcraping of the wheel to which this plank is faſtened, and from the weights laid upon it to promote the grinding or triture of the glaſſes. The whole is covered with a wheel B, made of hard light-wood, about ſix inches in diameter, by pulling of which backwards and forwards alternately, and ſometimes turning round, the workmen, who always ſtand oppoſite to each other, produce a conſtant attrition between the two glaſſes, and bring them to what degree of ſmoothneſs they pleaſe, by firſt pouring in water and coarſe ſand ; after that, a finer ſort of ſand, as the work advanceth, till at laſt they muſt pour in the powder of ſmalt. As the upper or incumbent glaſs poliſhes and grows ſmoother, it muſt be taken away, and another from time to time put in its place.

Plate CCXX.

This engine is called a *mill* by the artiſts, and is uſed only in the largeſt-ſized glaſſes ; for in the grinding of the leſſer glaſſes ; they are content to work without a wheel, and to have only four wooden handles faſtened to the four corners of the ſtone which loads the upper plank, by which they work it about.

When the grinder has done his part, who finds it very difficult to bring the glaſs to an exact plainneſs, it is turned over to the poliſher ; who, with the fine powder of tripoli ſtone or emery, brings it to a perfect evenneſs and luſtre. The inſtrument made uſe of in this branch is a board, *cc*, furniſhed with a felt, and a ſmall roller, which the workman moves by means of a double handle at both ends. The artiſt, in working this roller, is aſſiſted with a wooden hoop or ſpring, to the end of which it is fixed : for the ſpring, by conſtantly bringing the roller back to the ſame points, facilitates the action of the workman's arm.

Colouring of G*LASS.* That the colours given to glaſs may have their full beauty, it muſt be obſerved, that every pot when new, and firſt uſed, leaves a foulneſs in the glaſs from its own earthy parts; ſo that a coloured glaſs made in a new pot can never be bright or perfectly fine. For this reaſon, the larger of theſe, when new, may be glazed with white glaſs; but the ſecond time of uſing the pots loſe this foulneſs. The glazing may be done by reducing the glaſs to powder, and moiſtening the inſide of the pot with water; while it is yet moiſt, put in ſome of the powdered glaſs, and ſhake it about, till the whole inner ſurface of the pot be covered by as much as will adhere to it, in conſequence of the moiſture. Throw out the redundant part of the powdered glaſs; and the pot being dry, ſet it in a furnace ſufficiently hot to vitrify the glaſs adhering to it, and let it continue there ſometime; after which, care muſt be taken to let it cool gradually. Thoſe pots which have ſerved for one colour muſt not be uſed for another; for the remainder of the old matter will ſpoil the colour of the new. The colours muſt be very carefully calcined to a proper degree; for if they are calcined either too much or too little, they never do well; the proper proportion, as to quantity, muſt alſo carefully be regarded, and the furnaces muſt be fed with dry hard wood. And all the proceſſes ſucceed much the better if the colour be uſed dividedly, that is, a part of it in the frit, and the reſt in the melted metal.

A hard glaſs, proper for receiving colours, may be prepared by pulveriſing 12 pounds of the beſt ſand, cleanſed by waſhing in a glaſs or flint mortar, and mixing ſeven pounds of pearl-aſhes, or any fixed alkaline ſalt, purified with nitre, one pound of ſalt-petre, and half a pound of borax, and pounding them together. A glaſs leſs hard may be prepared of twelve pounds of white ſand cleanſed, ſeven pounds of pearl aſhes purified with ſaltpetre, one pound of nitre, half a pound of borax, and four ounces of arſenic, prepared as before.

Amethyſt coloured. See *Purple* below, and the article AMETHYST.

Balas-colour. Put into a pot cryſtal frit, thrice waſhed in water; tinge this with manganeſe, prepared into a clear purple; to this add *alumen cativum*, ſifted fine, in ſmall quantities, and at ſeveral times: this will make the glaſs grow yellowiſh, and a little reddiſh, but not blackiſh, and always diſſipates the manganeſe. The laſt time you add manganeſe give no more of the *alumen cativum*, unleſs the colour be too full. Thus will the glaſs be exactly of the colour of the balas-ruby. See *Ruby-Glass.*

The common black colour. The glaſs-makers take old broken glaſs of different colours, grind it to powder, and add to it, by different parcels, a ſufficient quantity of a mixture of two parts zaffer and one part manganeſe: when well purified, they work it into veſſels, &c.

Glaſs beads are coloured with manganeſe only.

Black velvet colour. To give this deep and fine colour to glaſs, take of cryſtalline and pulverine frit, of each 20 pounds; of calx of lead and tin four pounds; ſet all together in a pot in the furnace, well heated; when the glaſs is formed and pure, take ſteel well calcined and powdered, ſcales of iron that fly off from the ſmith's anvil, of each an equal quantity; powder and mix them well; then put ſix ounces of this powder to the above deſcribed metal while in fuſion; mix the whole thoroughly together, and let them all boil ſtrongly together; then let it ſtand in fuſion 12 hours to purify, and after this work it. It will be a moſt elegant velvet black.

There is another way of doing this, which alſo produces a very fair black. It is this; take a hundred weight of rochetta frit, add to this two pounds of tartar and ſix pounds of manganeſe, both in fine powder; mix them well, and put to them the metal while in fuſion, at different times, in ſeveral parcels; let it ſtand in fuſion after this for four days, and then work it.

A glaſs perfectly black may alſo be formed, to ten pounds of either of the compoſitions for hard glaſs above deſcribed, add one ounce of zaffer, ſix drams of manganeſe, an equal quantity of iron ſtrongly calcined.

Blue colour. A full blue may be made by adding ſix drams of zaffer and two drams of manganeſe to ten pounds of either of the compoſitions for hard glaſs, deſcribed above. For a very cool or pure blue glaſs, half an ounce of calcined copper may be uſed inſtead of the manganeſe, and the proportion of zaffer diminiſhed by one half. Glaſs reſembling ſapphire may be made with ten pounds of either of the compoſitions for hard glaſs, three drams and one ſcruple of zaffer, and one dram of the *calx caſſii*, or precipitation of gold by tin; or inſtead of this latter ingredient, two drams and two ſcruples of manganeſe. Or a ſapphire-coloured glaſs may be made by mixing with any quantity of the hard glaſs one eighth of its weight of ſmalt. For a beautiful blue glaſs produced from the calx of regulus of cobalt, ſee CHEMISTRY, nº 1299.

Venetian brown, with gold ſpangles, commonly called the *philoſopher's ſtone*, may be prepared in the following manner: take of the ſecond compoſition for hard glaſs above deſcribed, and of the compoſition for paſte, of each five pounds, and of highly calcined iron an ounce; mix them well, and fuſe them till the iron be perfectly vitrified, and has tinged the glaſs of a deep tranſparent yellow brown colour. Powder this glaſs, and add to it two pounds of powdered glaſs of antimony; grind them together, and thus mix them well. Take part of this mixture, and rub into it 80 to 100 leaves of the counterfeit leaf gold called *Dutch gold*; and when the parts of the gold ſeem ſufficiently divided, mix the powder containing it with the other part of the glaſs. Fuſe the whole with a moderate heat till the powder run into a vitreous maſs, fit to be wrought into any of the figures or veſſels into which it is uſually formed; but avoid a perfect liquefaction, becauſe that in a ſhort time deſtroys the equal diffuſion of the ſpangles, and vitrifies, at leaſt in part, the matter of which they are compoſed; converting the whole into a kind of tranſparent olive-coloured glaſs. This kind of glaſs is uſed for a great variety of toys and ornaments with us, who at preſent procure it from the Venetians.

Chalcedony. A mixture of ſeveral ingredients with the common matter of glaſs, will make it repreſent the ſemi-opake gems, the jaſpers, agates, chalcedonies, &c. The way of making theſe ſeems to be the ſame with the method of making marbled paper, by ſeveral colours diſſolved in ſeveral liquors, which are ſuch as will not readily mix with one another when put into water, before they are caſt upon the paper which is to be coloured. There are ſeveral ways of making theſe variouſly coloured glaſſes, but the beſt is the following.

Diſſolve four ounces of fine leaf ſilver in a glaſs veſſel in ſtrong aquafortis; ſtop up the veſſel, and ſet it aſide.—In another veſſel, diſſolve five ounces of quickſilver in a pound of aquafortis, and ſet this aſide.—In another glaſs veſſel, diſſolve in a pound of aquafortis three ounces of fine ſilver, firſt calcined in this manner: amalgamate the ſilver with mercury, mix the amalgagam with twice its weight of common ſalt well purified, put the mixture in an open fire in a crucible, that the mercury may fly off, and the ſilver be left in form of powder. Mix this powder with an equal quantity of common ſalt well purified, and calcine this for ſix hours in a ſtrong fire; when cold, waſh off the ſalt by repeated boilings in common water, and then put the ſilver into the aquafortis. Set this ſolution alſo aſide.—In another veſſel, diſſolve in a pound of aquafortis three ounces of ſal ammoniac; pour off the ſolution, and diſſolve in it a quarter of an ounce of gold. Set this alſo aſide.—In another veſſel, diſſolve three ounces of ſal ammoniac in a pound of aquafortis; then put into the ſolution cinnabar, crocus martis, ultramarine, and feretto of Spain, of each half an ounce. Set this alſo aſide.—In another veſſel, diſſolve in a pound of aquafortis three ounces of ſal ammoniac; then put into it crocus martis made with vinegar, calcined tin, zaffer, and cinnabar, of each half an ounce; let each of theſe be powdered very fine, and put gently into the aquafortis. Set this alſo aſide.—In another veſſel, diſſolve three ounces of ſal ammoniac in a pound of aquafortis, and add to it braſs calcined with brimſtone, braſs thrice calcined, manganeſe, and ſcales of iron which fall from the ſmith's anvil, of each half an ounce; let each be well powdered, and put gently into the veſſel. Then ſet this alſo aſide.—In another veſſel, diſſolve two ounces of ſal ammoniac in a pound of aquafortis, and put to it verdigris an ounce, red lead, crude antimony, and the caput mortuum of vitriol, of each half an ounce; put theſe well powdered leiſurely into the veſſel, and ſet this alſo aſide.—In another veſſel diſſolve two ounces of ſal ammoniac in a pound of aquafortis, and add orpiment, white arſenic, painters lake, of each half an ounce.

Keep the above nine veſſels in a moderate heat for 15 days, ſhaking them well at times. After this pour all the matters from theſe veſſels into one large veſſel well luted at its bottom; let this ſtand ſix days, ſhaking it at times; and then ſet it in a very gentle heat, and evaporate all the liquor, and there will remain a powder of a purpliſh green.

When this is to be wrought, put into a pot very clear metal, made of broken cryſtalline and white glaſs that has been uſed; for with the virgin-frit, or ſuch as has never been wrought, the chalcedony can never be made, as the colours do not ſtick to it, but are conſumed by the frit. To every pot of 20 pounds of this metal put two or three ounces of this powder at three ſeveral times: incorporate the powder well with the glaſs; and let it remain an hour between each time of putting in the powders. After all are in, let it ſtand 24 hours; then let the glaſs be well mixed, and take an aſſay of it, which will be found of a yellowiſh blue; return this many times into the furnace; when it begins to grow cold, it will ſhow many waves of different colours very beautifully. Then take tartar eight ounces, ſoot of the chimney two ounces, crocus martis made with brimſtone, half an ounce, let theſe be well powdered and mixed, and put them by degrees into the glaſs at ſix times, waiting a little while between each putting in. When the whole is put in, let the glaſs boil and ſettle for 24 hours; then make a little glaſs body of it; which put in the furnace many times, and ſee if the glaſs be enough, and whether it have on the outſide veins of blue, green, red, yellow, and other colours, and have, beſide theſe veins, waves like thoſe of the chalcedonies, jaſpers, and oriental agates, and if the body kept within looks as red as fire.

When it is found to anſwer thus, it is perfect, and may be worked into toys and veſſels, which will always be beautifully variegated: theſe muſt be well annealed, which adds much to the beauty of their veins. Maſſes of this may be poliſhed at the lapidary's wheel as natural ſtones, and appear very beautiful. If in the working the matter grow tranſparent, the work muſt be ſtopped, and more tartar, ſoot and crocus martis muſt be put to it, which will give it again the neceſſary body and opacity, without which it does not ſhow the colours well.

Chryſolite colour may be made of ten pounds of either of the compoſitions for hard glaſs deſcribed above, and ſix drams of calcined iron.

Red cornelian colour may be formed by adding one pound of glaſs of antimony, two ounces of the calcined vitriol called *ſcarlet ochre*, and one dram of mangaueſe or magneſia, to two pounds of either of the compoſitions for hard glaſs. The glaſs of antimony and magneſia are firſt fuſed with the other glaſs, and then powdered and ground with the ſcarlet ochre: the whole mixture is afterwards fuſed with a gentle heat till all the ingredients are incorporated. A glaſs reſembling the white cornelian may be made of two pounds of either of the compoſitions for hard glaſs, and two drams of yellow ochre well waſhed, and one ounce of calcined bones: grind them together, and fuſe them with a gentle heat.

Emerald colour. See *Green* below.

Garnet colour. To give this colour to glaſs, the workmen take the following method. They take equal quantities of cryſtal and rochetta frit, and to every hundred weight of this mixture they add a pound of manganeſe and an ounce of prepared zaffer: theſe are to be powdered ſeparately, then mixed and added by degrees to the frit while in the furnace. Great care is to be taken to mix the manganeſe and zaffer very perfectly; and when the matter has ſtood 24 hours in fuſion, it may be worked.

Glaſs of this kind may be made by adding one pound of glaſs of antimony, one dram of manganeſe, and the ſame quantity of the precipitate of gold by tin, to two pounds of either of the compoſitions for hard glaſs; or the precipitate of gold may be omitted, if the quantities of the glaſs of antimony and manganeſe be doubled.

Gold colour. This colour may be produced by taking ten pounds of either of the compoſitions for hard glaſs, omitting the ſalt petre ; and for every pound adding an ounce of calcined borax, or, if this quantity doth not render the glaſs ſufficiently fuſible, two ounces ; ten ounces of red tartar of the deepeſt colour ; two ounces of magneſia ; and two drams of charcoal of ſallow, or any other ſoft kind. Precipitates of ſilver baked on glaſs will ſtain it yellow, and likewiſe give a yellow colour on being mixed and melted with 40 or 50 times their weight of vitreous compoſitions : the precipitate from aquafortis by fixed alkali ſeems to anſwer beſt. Yellow glaſſes may alſo be obtained with certain preparations of iron, particularly with Pruſſian blue. But Dr Lewis obſerves, that the colour does not conſtantly ſucceed, nor approach to the high colour of gold, with ſilver or with iron. The neareſt imitations of gold which he has been able to produce have been effected with antimony and lead. Equal parts of the glaſs of antimony, of flint calcined and powdered, and of minium, formed a glaſs of a high yellow ; and with two parts of glaſs of antimony, two of minium, and three of powdered flint, the colour approached ſtill more to that of gold. The laſt compoſition exhibited a multitude of ſmall ſparkles interſperſed throughout its whole ſubſtance, which gave it a beautiful appearance in the maſs, but were really imperfections, owing to air-bubbles.

Neri directs, for a gold-yellow colour, one part of red tartar and the ſame quantity of manganeſe, to be mixed with a hundred parts of frit. But Kunckel obſerves, that theſe proportions are faulty ; that one part, or one and a quarter, of manganeſe, is ſufficient for a hundred of frit ; but that ſix parts of tartar are hardly enough, unleſs the tartar is of a dark red colour, almoſt blackiſh ; and that he found it expedient to add to the tartar about a fourth of its weight of powdered charcoal. He adds, that the glaſs ſwells up very much in melting, and that it muſt be left unſtirred, and worked as it ſtands in fuſion. Mr Samuel More, in repeating and varying this proceſs in order to render the colour more perfect, found that the manganeſe is entirely uneſſential to the gold colour, and that the tartar is no otherwiſe in uſe than in virtue of the coaly matter to which it is in part reduced by the fire, the phlogiſton or inflammable part of the coal appearing in ſeveral experiments to be the direct tinging ſubſtance. Mr Pot alſo obſerves, that common coals give a yellow colour to glaſs ; that different coaly matters differ in their tinging power ; that caput mortuum of ſoot and lamp black anſwer better than common charcoal ; and that the ſparkling coal, which remains in the retort after the rectification of the thick empyreumatic animal oils, is one of the moſt active of theſe preparations. This preparation, he ſays, powdered, and then burnt again a little in a cloſe veſſel, is excellent for tinging glaſs, and gives yellow, brown, reddiſh, or blackiſh colours, according to its quantity ; but the frit muſt not be very hard of fuſion, for in this caſe the ſtrong fire will deſtroy the colouring ſubſtance before the glaſs melts : and he has found the following compoſitions to be nearly the beſt ; viz. ſand two parts, alkali three parts ; or ſand two, alkali three, calcined borax one ; or ſand two, alkali two, calcined borax one : and though ſaltpetre is hardly uſed at all, or very ſparingly, for yellow glaſſes, as it too much volatilizes the colouring ſubſtance ; yet here for the moſt part a certain proportion of it, eaſily determined by trial is very neceſſary ; for without it the concentrated colouring matter is apt to make the glaſs too dark, and even of an opake pitchy blackneſs. It does not certainly appear that there is any material diverſity in the effects of different coals, the difference being probably owing to the different quantities of the inflammable matter which they contain ; ſo that a little more ſhall be required of one kind than of another for producing the ſame degree of colour in the glaſs. Nor does the ſoftneſs or fuſibility of the frit appear to be in any reſpect neceſſary.

Gold-coloured ſpangles may be diffuſed through the ſubſtance of glaſs, by mixing the yellow talcs with powdered glaſs, and bringing the mixture into fuſion.

Green. This colour may be imparted to glaſs by adding three ounces of copper precipitated from aquafortis, and two drams of precipitated iron to nine pounds of either of the compoſitions for hard glaſs. The fineſt method of giving this beautiful colour to glaſs is this : Take five pounds of cryſtalline metal that has been paſſed ſeveral times through water, and the ſame quantity of the common white metal of polverine, four pounds of common polverine frit, and three pounds of red-lead ; mix the red-lead well with the frit, and then put all into a pot in a furnace. In a few hours the whole maſs will be well purified : then caſt the whole into water, and ſeparate and take out the lead ; then return the metal into the pot, and let it ſtand a day longer in fuſion ; then put in the powder of the reſiduum of the vitriol of copper, and a very little crocus martis, there will be produced a moſt lively and elegant green, ſcarce inferior to that of the oriental emerald. There are many ways of giving a green to glaſs, but all are greatly inferior to this.—To make a *ſea-green,* the fineſt cryſtalline glaſs only muſt be uſed, and no manganeſe muſt be added at firſt to the metal. The cryſtal frit muſt be melted thus alone ; and the ſalt, which ſwims like oil on its top, muſt be taken off with an iron ladle very carefully. Then to a pot of twenty pound of this metal add ſix ounces of calcined braſs, and a fourth part of the quantity of powdered zaffer : this powder muſt be well mixed, and put into the glaſs at three times ; it will make the metal ſwell at firſt, and all muſt be thoroughly mixed in the pot. After it has ſtood in fuſion three hours, take out a little for a proof : if it be too pale, add more of the powder. Twenty-four hours after the mixing the powder the whole will be ready to work ; but it muſt be well ſtirred together from the bottom, leſt the colour ſhould be deepeſt there, and the metal at the top leſs coloured, or even quite colourleſs. Some uſe for this purpoſe half cryſtal frit and half rochetta frit, but the colour is much the fineſt when all cryſtal frit is uſed.

Lapis lazuli colour. See *Lapis* Lazuli.

Opal colour. See Opal.

Purple of a deep and bright colour may be produced by adding to ten pounds of either of the compoſitions for hard glaſs, above deſcribed, ſix drams of zaffer and one dram of gold precipitated by tin ; or to the ſame quantity of either compoſition one ounce of manganeſe and half an ounce of zaffer. The colour of amethyſt may be imitated in this way.

Red. A blood-red glaſs may be made in the following manner: Put ſix pounds of glaſs of lead, and ten pounds of common glaſs, into a pot glazed with white glaſs. When the whole is boiled and refined, add by ſmall quantities, and at ſmall diſtances of time, copper calcined to a redneſs as much as on repeated proofs is found ſufficient: then add tartar in powder by ſmall quantities at a time, till the glaſs is become as red as blood; and continue adding one or other of the ingredients till the colour is quite perfect.

Ruby. The way to give the true fine red of the ruby, with a fair tranſparence, to glaſs, is as follows: Calcine in earthen veſſels gold diſſolved in aqua-regia; the menſtruum being evaporated by diſtillation, more aqua regia added, and the abſtraction repeated five or ſix times, till it becomes a red powder. This operation will require many days in a hot furnace. When the powder is of a proper colour, take it out: and when it is to be uſed, melt the fineſt cryſtal glaſs, and purify it by often caſting it into water; and then add, by ſmall quantities, enough of this red powder to give it the true colour of a ruby, with an elegant and perfect tranſparence.

The proceſs of tinging glaſs and enamels by preparations of gold was firſt attempted about the beginning of the laſt century. Libavius, in one of his tracts intitled *Alchimia,* printed in 1606, conjectures that the colour of the ruby proceeds from gold, and that gold diſſolved and brought to redneſs might be made to communicate a like colour to factitious gems and glaſs. On this principle Neri, in his Art of Glaſs, dated in 1611, gives the proceſs above recited. Glauber in 1648 publiſhed a method of producing a red colour by gold, in a matter which is of the vitreous kind, though not perfect glaſs. For this purpoſe he ground powdered flint or ſand with four times its weight of fixed alkaline ſalt: this mixture melts in a moderately ſtrong fire, and when cold looks like glaſs, but expoſed to the air runs into a liquid ſtate. On adding this liquor to ſolution of gold in aqua-regia, the gold and flint precipitate together in form of a yellow powder, which by calcination becomes purple. By mixing this powder with three or four times its weight of the alkaline ſolution of flint, drying the mixture, and melting it in a ſtrong fire for an hour, a maſs is obtained of a tranſparent ruby colour, and of a vitreous appearance; which nevertheleſs is ſoluble in water, or by the moiſture of the air, on account of the redundance of the ſalt. The honourable Mr Boyle, in a work publiſhed in 1680, mentions an experiment in which a like colour was introduced into glaſs without fuſion; for having kept a mixture of gold and mercury in digeſtion for ſome months, the fire was at laſt immoderately increaſed, ſo that the glaſs burſt with a violent exploſion; and the lower part of the glaſs was found tinged throughout of a tranſparent red colour, hardly to be equalled by that of rubies.

About the ſame time Caſſius is ſaid to have diſcovered the precipitation of gold by tin, and that glaſs might be tinged of a ruby colour by melting it with this precipitate; though he does not appear, ſays Dr Lewis, from his treatiſe *De Auro,* to have been the diſcoverer of either. He deſcribes the preparation of the precipitate and its uſe; but gives no account of the manner of employing it, only that he ſays one dram of gold duly prepared will tinge ten pounds of glaſs.

Commerce of Arts, p. 171, 621, &c.

This proceſs was ſoon after brought to perfection by Kunckel; who ſays, that one part of the precipitate is ſufficient to give a ruby colour to 1280 parts of glaſs, and a ſenſible redneſs to upwards of 1900 parts; but that the ſucceſs is by no means conſtant. Kunckel alſo mentions a purple-gold powder, reſembling that of Neri; which he obtained by inſpiſſating ſolution of gold to dryneſs; abſtracting from it freſh aqua-regia three or four times, till the matter appears like oil; then precipitating with ſtrong alkaline ley, and waſhing the precipitate with water. By diſſolving this powder in ſpirit of ſalt and precipitating again, it becomes, he ſays, extremely fair; and in this ſtate he directs it to be mixed with a due proportion of Venice glaſs.

Orchal, in a treatiſe intitled *Sol ſine Veſte,* gives the following proceſs for producing a very fine ruby. He directs the purple precipitate made by tin to be ground with ſix times its quantity of Venice glaſs into a very fine powder, and this compound to be very carefully mingled with the frit or vitreous compoſition to be tinged. His frit conſiſts of equal parts of borax, nitre, and fixed alkaline ſalt, and four times as much calcined flint as of each of the ſalts; but he gives no directions as to the proportion of the gold precipitate or mode of fuſion. Hellot deſcribes a preparation, which, mixed with Venice glaſs, was found to give a beautiful purple enamel. This preparation conſiſts of equal parts of ſolution of gold and of ſolution of zinc in aqua-regia mixed together, with the addition of a volatile ſalt prepared from ſal ammoniac by quicklime, in ſufficient quantity to precipitate the two metals. The precipitate is then gradually heated till it acquires a violet colour. However, though a purple or red colour, approaching to that of ruby, may, by the methods above recited, be baked on glaſs or enamels, and introduced into the maſs by fuſion, the way of equally diffuſing ſuch a colour through a quantity of fluid glaſs is ſtill, ſays Dr Lewis, a ſecret. The following proceſs for making the ruby glaſs was communicated to Dr Lewis by an artiſt, who aſcribed it to Kunckel. The gold is directed to be diſſolved in a mixture of one part of ſpirit of ſalt and three of aquafortis, and the tin in a mixture of one part of the former of theſe acids with two of the latter. The ſolution of gold being properly diluted with water, the ſolution of tin is added, and the mixture left to ſtand till the purple matter has ſettled to the bottom. The colourleſs liquor is then poured off, and the purple ſediment, while moiſt and not very thick, is thoroughly mixed with powdered flint or ſand. This mixture is well ground with powdered nitre, tartar, borax, and arſenic, and the compound melted with a ſuitable fire. The proportions of the ingredients are 2560 parts of ſand, 384 of nitre, 240 of tartar, 240 of borax, 28 of arſenic, 5 of tin, and 5 of gold.

Topaz colour. Glaſs reſembling this ſtone may be made by pulverizing ten pounds of either of the compoſitions for hard glaſs with an equal quantity of the gold-coloured glaſs, and fuſing them together.

White opake and *ſemi-tranſparent* glaſs may be made of ten pounds of either of the compoſitions for hard glaſs and one pound of well calcined horn, ivory, or bone;

or an opake whiteneſs may be given to glaſs by adding one pound of very white arſenic to ten pounds of flint glaſs. Let them be well powdered and mixed by grinding them together, and then fuſed with a moderate heat till they are thoroughly incorporated. A glaſs of this kind is made in large quantities at a manufacture near London; and uſed not only for different kinds of veſſels, but as a white ground for enamel in dial-plates and ſnuff-boxes, which do not require finiſhing with much fire, becauſe it becomes very white and fuſible with a moderate heat.

Yellow. See *Gold colour* above.

Painting in GLASS. The ancient manner of painting in glaſs was very ſimple; it conſiſted in the mere arrangement of pieces of glaſs of different colours in ſome ſort of ſymmetry, and conſtituted what is now called *Moſaic work*. See MOSAIC.

In proceſs of time they came to attempt more regular deſigns, and alſo to repreſent figures heightened with all their ſhades: yet they proceeded no farther than the contours of the figures in black with water-colours, and hatching the draperies after the ſame manner on glaſſes of the colour of the object they deſigned to paint. For the carnation, they uſed glaſs of a bright red colour; and upon this they drew the principal lineaments of the face, &c. with black.

At length, the taſte for this ſort of painting improving conſiderably, and the art being found applicable to the adorning of churches, baſilics, &c. they found out means of incorporating the colours in the glaſs itſelf, by heating them in the fire to a proper degree; having firſt laid on the colours. A French painter at Marſeilles is ſaid to have given the firſt notion of this improvement, upon going to Rome under the pontificate of Julius II.; but Albert Durer and Lucas of Leyden were the firſt that carried it to any height.

This art, however, has frequently met with much interruption, and ſometimes been almoſt totally loſt; of which Mr Walpole gives us the following account, in his Anecdotes of Painting in England.

“ The firſt interruption given to it was by the reformation, which baniſhed the art out of churches; yet it was in ſome meaſure kept up in the eſcutcheons of the nobility and gentry in the windows of their ſeats. Towards the end of queen Elizabeth's reign it was omitted even there; yet the practice did not entirely ceaſe. The chapel of our Lady at Warwick was ornamented anew by Robert Dudley earl of Leiceſter, and his counteſs, and the cipher of the glaſs painter's name yet remains, with the date 1574: and in ſome of the Chapels at Oxford the art again appears, dating itſelf in 1622, by the hand of no contemptible maſter.

“ I could ſupply even this gap of 48 years by many dates on Flemiſh glaſs: but nobody ever ſuppoſed that the ſecret was loſt ſo early as the reign of James I. and that it has not periſhed ſince will be evident from the following ſeries, reaching to the preſent hour.

“ The portraits in the windows of the library at All Souls, Oxford. In the chapel at Queen's College there are twelve windows dated 1518. P. C. a cipher on the painted glaſs in the chapel at Warwick, 1574. The windows at Wadham-college: the drawing pretty good, and the colours fine, by Bernard Van Linge, 1622. In the chapel at Lincoln's Inn, a window, with the name Bernard, 1623. This was probably the preceding Van Linge. In the church of St Leonard, Shoreditch, two windows by Baptiſta Sutton, 1634. The windows in the chapel at Univerſity-college, Hen. Giles *pinxit*, 1687. At Chriſt-church Iſaac Oliver, aged 84, 1700. Window in Merton-chapel, William Price, 1700. Windows at Queen's New-College, and Maunlin, by William Price, the ſon, now living, whoſe colours are fine, whoſe drawing is good, and whoſe taſte in ornaments and moſaic is far ſuperior to any of his predeceſſors; is equal to the antique, to the good Italian maſters, and only ſurpaſſed by his own ſingular modeſty.

“ It may not be unwelcome to the curious reader to ſee ſome anecdotes of the revival of taſte for painted glaſs in England. Price, as we have ſaid, was the only painter in that ſtyle for many years in England. Afterwards one Rowell, a plumber at Reading, did ſome things, particularly for the late Henry earl of Pembroke; but Rowell's colours ſoon vaniſhed. At laſt he found out a very durable and beautiful red; but he died in a year or two, and the ſecret with him. A man at Birmingham began the ſame art in 1756 or 1757, and fitted up a window for Lord Lyttleton, in the church of Hagely; but ſoon broke. A little after him, one Peckitt at York began the ſame buſineſs, and has made good proficiency. A few lovers of that art collected ſome diſperſed panes from ancient buildings, particularly the late lord Cobham, who erected a Gothic temple at Stowe, and filled it with arms of the old nobility, &c. About the year 1753, one Aſciotti, an Italian, who had married a Flemiſh woman, brought a parcel of painted glaſs from Flanders, and ſold it for a few guineas to the honourable Mr Bateman, of Old Windſor. Upon that I ſent Aſciotti again to Flanders, who brought me 450 pieces, for which, including the expence of his journey, I paid him 36 guineas. His wife made more journeys for the ſame purpoſe; and ſold her cargoes to one Palmer, a glazier in St Martin's-lane, who immediately raiſed the price to one, two, or five guineas for a ſingle piece, and fitted up entire windows with them, and with moſaics of plain glaſs of different colours. In 1761, Paterſon, an auctioneer at Eſſex houſe in the Strand, exhibited the two firſt auctions of painted glaſs, imported in like manner from Flanders. All this manufacture conſiſted in rounds of ſcripture ſtories, ſtained in black and yellow, or in ſmall figures of black and white; birds and flowers in colours, and Flemiſh coats of arms.”

The colours uſed in painting or ſtaining of glaſs are very different from thoſe uſed in painting either in water or oil colours.

For black, take ſcales of iron, one ounce; ſcales of copper, one ounce; jet, half an ounce: reduce them to powder, and mix them. For blue, take powder of blue, one pound; ſal nitre, half a pound; mix them and grind them well together. For carnation, take red chalk, eight ounces; iron ſcales, and litharge of ſilver, of each two ounces; gum arabic, half an ounce; diſſolve in water; grind all together for half an hour as ſtiff as you can; then put it in a glaſs and ſtir it well, and let it ſtand to ſettle fourteen days. For green, take red-lead, one pound; ſcales of copper, one pound; and flint, five pounds: divide them into three parts; and add to them as much ſal nitre;

put them into a crucible, and melt them with a ſtrong fire; and when it is cold, powder it, and grind it on a porphyry. For gold colour, take ſilver, an ounce; antimony, half an ounce; melt them in a crucible; then pound the maſs to powder, and grind it on a copper plate; add to it yellow ochre, or brick-duſt calcined again, fifteen ounces; and grind them well together with water. For the purple, take minium one pound; brown ſtone, one pound; white flint, five pounds: divide them into three parts, and add to them as much ſal nitre as one of the parts; calcine, melt, and grind it as you did the green. For red, take jet, four ounces; litharge of ſilver, two ounces; red chalk, one ounce; powder them fine, and mix them. For white, take jet, two parts; white flint, ground on a glaſs very fine, one part; mix them. For yellow, take Spaniſh brown, ten parts; leaf-ſilver, one part; antimony, half a part; put all into a crucible, and calcine them well.

In the windows of ancient churches, &c. there are to be ſeen the moſt beautiful and vivid colours imaginable, which far exceed any of thoſe uſed by the moderns, not ſo much becauſe the ſecret of making thoſe colours is etirely loſt, as that the moderns will not go to the charge of them, nor be at the neceſſary pains, by reaſon that this ſort of painting is not now ſo much in eſteem as formerly. Thoſe beautiful works which were made in the glaſs-houſes were of two kinds.

In ſome, the colour was diffuſed through the whole ſubſtance of the glaſs. In others, which were the more common, the colour was only on one ſide, ſcarce penetrating within the ſubſtance above one-third of a line; though this was more or leſs according to the nature of the colour, the yellow being always found to enter the deepeſt. Theſe laſt, though not ſo ſtrong and beautiful as the former, were of more advantage to the workmen, by reaſon that on the ſame glaſs, though already coloured, they could ſhow other kinds of colours where there was occaſion to embroider draperies, enrich them with foliages, to repreſent other ornaments of gold, ſilver, &c.

In order to this, they made uſe of emery, grinding or wearing down the ſurface of the glaſs till ſuch time as they were got through the colour to the clear glaſs. This done, they applied the proper colours on the other ſide of the glaſs. By theſe means, the new colours were hindered from running and mixing with the former, when they expoſed the glaſſes to the fire, as will appear hereafter.

When indeed the ornaments were to appear white, the glaſs was only bared of its coloured with emery, without tinging the place with any colour at all; and this was the manner by which they wrought their lights and heightenings on all kinds of colour.

The firſt thing to be done, in order to paint or ſtain glaſs, in the modern way, is to deſign, and even colour the whole ſubject on paper. Then they chooſe ſuch pieces of glaſs as are clear, even, and ſmooth, and proper to recieve the ſeveral parts; and proceed to diſtribute the deſign itſelf, or papers it is drawn on, into pieces ſuitable to thoſe of the glaſs; always taking care that the glaſſes may join in the contours of the figures and the folds of the draperies; that the carnations, and other finer parts, may not be impaired by the lead with which the pieces are to be joined together. The diſtribution being made, they mark all the glaſſes as well as papers, that they may be known again: which done, applying every part of the deſign upon the glaſs intended for it, they copy or transfer the deſign upon this glaſs with the back colour diluted in gum-water, by tracing and following all the lines and ſtrokes as they appear through the glaſs with the point of a pencil.

When theſe ſtrokes are well dried, which will happen in about two days, the work being only in black and white, they give a ſlight waſh over with urine, gum arabic, and a little black; and repeat it ſeveral times, according as the ſhades are deſired to be heightened; with this precaution, never to apply a new waſh till the former is ſufficiently dried.

This done, the lights and riſings are given by rubbing off the colour in the reſpective places with a wooden point, or the handle of the pencil.

As to the other colours abovementioned, they are uſed with gum-water, much as in painting in miniature; taking care to apply them lightly, for fear of effacing the outlines of the deſign; or even, for the greater ſecurity, to apply them on the other ſide; eſpecially yellow, which is very pernicious to the other colours, by blending therewith. And here too, as in pieces of black and white, particular regard muſt always be had not to lay colour on colour, or lay on a new lay, till ſuch time as the former are well dried.

It may be added, that the yellow is the only colour that penetrates through the glaſs, and incorporates therewith by the fire; the reſt, and particularly the blue, which is very difficult to uſe, remaining on the ſurface, or at leaſt entering very little. When the painting of all the pieces is finiſhed, they are carried to the furnace or oven to anneal or bake the colours.

The furnace here uſed is ſmall, built of brick, from 18 to 30 inches ſquare. At ſix inches from the bottom is an aperture to put in the fuel and maintain the fire. Over this aperture is a grate made of three ſquare bars of iron, which traverſe the furnace, and divide it into two parts. Two inches above this partition is another little aperture, through which they take out pieces to examine how the coction goes forward. On the grate is placed a ſquare earthen pan, ſix or ſeven inches deep, and five or ſix inches leſs every way than the perimeter of the furnace. On the one ſide hereof is a little aperture, through which to make trials, placed directly oppoſite to that of the furnaces deſtined for the ſame end. In this pain are the pieces of glaſs to be placed in the following manner: Firſt, the bottom of the pan is covered with three ſtrata or layers of quicklime pulveriſed; theſe ſtrata being ſeparated by two others of old broken glaſs, the deſign whereof is to ſecure the painted glaſs from the too intenſe heat of the fire. This done, the glaſſes are laid horizontally on the laſt or uppermoſt layer of lime.

The firſt row of glaſs they cover over with a layer of the ſame powder an inch deep; over this they lay another range of glaſſes, and thus alternately till the pan is quite full; taking care that the whole heap always end with a layer of the lime-powder.

The pan being thus prepared, they cover up the furnace with tiles, on a ſquare table of earthen ware cloſely luted all round ; only leaving five little apertures, one at each corner, and another in the middle, to ſerve as chimneys. Things thus diſpoſed, there remains nothing but to give the fire to the work. The fire for the firſt two hours muſt be very moderate, and muſt be increaſed in proportion as the coction advances, for the ſpace of ten or twelve hours ; in which time it is uſually completed. At laſt the fire, which at firſt was charcoal, is to be of dry wood, ſo that the flame covers the whole pan, and even iſſues out at the chimneys.

During the laſt hours, they make eſſays, from time to time, by taking out pieces laid for the purpoſe through the little aperture of the furnace and pan, to ſee whether the yellow be perfect, and the other colours in good order. When the annealing is thought ſufficient, they proceed with great haſte to extinguiſh the fire, which otherwiſe would ſoon burn the colours, and break the glaſſes.

Glass-Balls, which are circular or otherwiſe ſhaped hollow veſſels of glaſs, may be coloured within, ſo as to imitate the ſemipellucid gems. The method of doing it is this: make a ſtrong ſolution of ichthyocolla, or iſinglaſs, in common water, by boiling ; pour a quantity of this while warm into the hollow of a white glaſs veſſel ; ſhake it thoroughly about, that all the ſides may be wetted, and then pour off the reſt of the moiſture. Immediately after this, throw in red-lead, ſhake it and turn it about, throw it into many places with a tube, and the moiſture will make it ſtick and run in waves and pretty figures. Then throw in ſome of the painter's blue ſmalt, and make it run in waves in the ball as the read-lead ; then do the ſame with verdegris, next with orpiment, then with red lake, all well ground ; always caſting in the colours in different places, and turning the glaſs, that the moiſture within may run them into the waves. Then take fine plaſter of Paris, and put a quantity of it into the ball ; ſhake it alſo nimbly about ; this will every where ſtick firmly to the glaſs, and give it a ſtrong inner coat, keeping all the colours on very fairly and ſtrongly. Theſe are ſet on frames of carved wood, and much eſteemed as ornaments in many places.

Glass-Drops. See *Rupert's drops.*

Engraving on Glass. See Chemistry, n° 2d 857.

Foliating of Glass. See *Foliating and Looking-glaſs.*

Gilding of Glass. See Gilding.

Impreſſions of antique Gems taken in Glass. See Gems.

Glass of Lead, a glaſs made with the addition of a large quantity of lead, of great uſe in the art of making counterfeit gems. The method of making it is this : Put a large quantity of lead into a potter's kiln, and keep it in a ſtate of fuſion with a moderate fire, till it is calcined to a grey looſe powder ; then ſpread it in the kiln, and give it a greater heat, continually ſtirring it to keep it from running into lumps ; continue this ſeveral hours, till the powder become of a fair yellow ; then take it out, and ſift it fine : this is called *calcined lead.* Take of this calcined lead 15 pounds, and cryſtalline or other frit 12 pounds ; mix theſe as well as poſſible together ; put them into a pot, and ſet them in the furnace for ten hours ; then caſt the whole, which will be now perfectly melted, into water ; ſeparate the looſe lead from it, and return the metal into the pot ; and after ſtanding in fuſion 12 hours more, it will be fit to work. It is very tender and brittle, and muſt be worked with great care, taking it ſlowly out of the pot, and continually wetting the marble it is wrought upon.

It is well known that ceruſs or white lead, minium, litharge, and all the other preparations and calces of lead, are eaſily fuſed by a moderate fire, and formed into a tranſparent glaſs of a deep yellow colour. But this glaſs is ſo penetrating and powerful a flux, that it is neceſſary to give it a greater conſiſtence, in order to render it fit for uſe. With this view, two parts of calx of lead, e. g. minium, and one part of ſand or powdered flints, may be put into a crucible of refractory clay, and baked into a compact body. Let this crucible, well cloſed with a luted lid, be placed in a melting furnace, and gradually heated for an hour or an hour and a half ; and afterwards let the heat be increaſed ſo as to obtain a complete fuſion, and continued in that ſtate for the ſame time : let the crucible remain to cool in the furnace ; and when it is broken, a very tranſparent yellow-coloured glaſs will be found in it. Some add nitre and common ſalt to the above mixture, becauſe theſe ſalts promote the fuſion and the more equal diſtribution of the ſand. This glaſs of lead has a conſiderable ſpecific gravity, and its loweſt part is always the heavieſt. It is an important flux in the eſſays of ores to facilitate their ſcorifications.

Glaſs of lead is capable of all the colours of the gems in very great perfection. The methods of giving them are theſe : for green, take polverine frit 20 pounds, lead calcined 16 pounds ; ſift both the powders very fine ; then melt them into a glaſs, ſeparating the unmixed lead, by plunging the maſs in water ; after this return it into the pot, and add braſs thrice calcined ſix ounces, and one penny-weight of crocus martis made with vinegar ; put this in at ſix different times, always carefully mixing it together ; let it finally ſettle an hour, then mix it together, and take a proof of it ; when the colour is right, let it ſtand eight hours, and then work it. If inſtead of the calcined braſs the ſame quantity of the caput mortuum of the vitriolum veneris be uſed, the green is yet much finer.

For topaz-colour, take cryſtal frit 15 pounds, calcined lead 12 pounds ; mix them well together, by ſifting the powders through a fine ſieve ; then ſet them in a furnace not too hot, and ſeparate the ſuperfluous unmixed lead, by caſting the whole into water ; repeat this twice : then add half gold yellow glaſs, and let them incorporate and purify, and they will be of the true and exact colour of the oriental topazes.

For ſea-green, take cryſtal frit 16 pounds, calcined lead 10 pounds : mix and ſift them together, and ſet them in a pot in a furnace ; in 12 hours the whole will be melted ; then caſt it into water, and ſeparate it from the looſe lead ; put them into the furnace again for eight hours ; then ſeparate the looſe lead by waſhing a ſecond time, and return it to the pot for eight hours more.

Muſcovy Glass. See Mica.

Painting on Glaſs by means of Prints. See *Back-painting.*

Glass-Porcelain, the name given by many to a modern invention of imitating the china-ware with glaſs.

The method given by Mr Reaumur, who was the firſt that carried the attempt to any degree of perfection, is ſhortly this: The glaſs-veſſels to be converted into porcelain are to be put into a large earthen veſſel, ſuch as the common fine earthen diſhes are baked in, or into ſufficiently large crucibles; the veſſels are to be filled with a mixture of fine white ſand, and of fine gypſum or plaſter-ſtone burnt into what is called plaſter of Paris, and all the interſtices are to be filled up with the ſame powder, ſo that the glaſs veſſels may no where touch either one another, or the ſides of the veſſel they are baked in. The veſſel is to be then covered down and luted, and the fire does the reſt of the work; for this is only to be put into a common potter's furnace, and when it has ſtood there the uſual time of the baking the other veſſels, it is to be taken out, and the whole contents will be found no longer glaſs, but converted into a white opake ſubſtance, which is a very elegant porcelain, and has almoſt the properties of that of China.

The powder which has ſerved once will do again as well as freſh, and that for a great many times: nay, it ſeems ever ſo often. The cauſe of this transformation, ſays Macquer, is probably that the vitriolic acid of the gypſum quits its baſis of calcareous earth, and unites with the alkaline ſalt and ſaline earth, of the glaſs, with which it forms a kind of ſalt or ſelenites, different from the calcareous ſelenites, by the interpoſition of which matter the glaſs acquires the qualities of porcelain. See further on this ſubject the article CHEMISTRY, nº 591—594.

Glaſs-Pots, the veſſels in the glaſs trade uſed for melting the glaſs. Thoſe for the white glaſs works are made of a tobacco-pipe clay, brought from the Iſle of Wight, which is firſt well waſhed, then calcined and afterwards ground to a fine powder in a mill; which being mixt with water, is then trod with the bare feet till it is of a proper conſiſtence to mould with the hands into the proper ſhape of the veſſels. When theſe are thus made, they are afterwards annealed over the furnace. Thoſe for the green glaſs work are made of the nonſuch, and another kind of clay from Stafford ſhire: they make theſe ſo large as to hold three or four hundred weight of metal. And beſides theſe, they have a ſmall ſort called piling-pots, which they ſet upon the larger, and which contain a finer and more nice metal fit for the niceſt works.

The clay that is uſed for this purpoſe ſhould be of the pureſt and moſt refractory kind, and well cleanſed from all ſandy, ferruginous, and pyritous matters; and to this it will be proper to add ground crucibles; white ſand, calcined flints duly levigated, or a certain proportion of the ſame clay baked, and pounded not very finely. The quantity of baked clay that ought to be mixed with the crude clay, to prevent the pots from cracking when dried, or expoſed to a great heat, is not abſolutely determined, but depends on the equality of the crude clay, which is more or leſs fat. M. D'Antic, in a memoir on this ſubject, propoſes the following method of aſcertaining it; the burnt and crude clay, being mixed in different proportions, ſhould be formed into cakes, one inch thick, and four inches long and wide. Let theſe cakes be ſlowly dried; and expoſed to a violent heat, till they become as hard and as much contracted as poſſible, and in this ſtate be examined; and the cake, he ſays, which has ſuffered a diminution of its bulk equal only to an eighteenth part, is made of the beſt proportions. He obſerves, in general, that moſt clays require that the proportion of the burnt ſhould be to the freſh as four to five.

Tin-Glaſs, the ſame with Biſmuth. See the article BISMUTH; alſo CHEMISTRY, nº 1250.

Veſſels of Glaſs uſed in Chemical Experiments. See CHEMISTRY, nº 556.

GLASSES are diſtinguiſhed, with regard to their form, uſe, &c. into various kinds, as, drinking glaſſes, optical-glaſſes, looking-glaſſes, burning glaſſes, &c.

Drinking-Glaſſes, are ſimple veſſels of common glaſs or cryſtal; uſually made in form of an inverted cone.

Each glaſs conſiſts of three parts, viz. the calyx or bowl, the bottom, and the foot; which are all wrought or blown ſeparately.

Nothing can be more dexterous and expeditious than the manner wherein theſe parts are blown; two of them opened, and all three joined together. An idea is only to be had thereof by ſeeing them actually at work.

The glaſſes chiefly uſed in England are made of the aſhes of fern, cryſtal glaſſes being leſs frequent in uſe. The exceeding brittleneſs of this commodity, notwithſtanding the eaſy rate of each glaſs, renders the conſumption thereof very conſiderable. For the method of gilding the edges of drinking glaſſes, ſee *GILDING on Enamel and Glaſs.*

Optical-Glaſſes. See OPTICS.

The improvements hitherto made in teleſcopes by means of combining lenſes made of different kinds of glaſs, though very great, are yet by no means adequate to the expectations that might reaſonably be formed if opticians could fall on any method of obtaining pieces of glaſs ſufficiently large for purſuing the advantages of Mr Dollond's diſcovery. Unfortunately, however, though the board of longitude have offered a conſiderable reward for bringing this art to the requiſite perfection, no attempt of any conſequence has hitherto been made. Mr Kier is of opinion, that the accompliſhment of this by no means an eaſy taſk; as it requires not only a competent knowledge of the properties of glaſs fitteſt for the purpoſe (the faults not being evident to common inſpection), but a conſiderable degree of chemical knowledge is alſo neceſſary in order to invent a compoſition by which theſe faults may be avoided; and laſtly, a kind of dexterity in the execution of the work, which can only be acquired by practice. Our author, however, thinks, that if the ſubject were more generally underſtood, and the difficulties more fully pointed out, for which purpoſe he makes the following remarks, the end might be more eaſily accompliſhed.

1. The rays of light paſſing through a glaſs lens or priſm, or through any other medium of unequal thickneſs, are refracted; but not in an equal manner, the blue, violet, &c. being more refracted than the red.

2. Hence it happens, that the rays of light, when refracted by a common lens, do not all unite in one focus, but in reality form as many different foci as there are colours; and hence ariſe the priſmatic colours, or iriſes, which appear towards the borders of the image formed by the common convex lenſes, and which render the viſion extremely indiſtinct.

3. The indiſtinctneſs of viſion produced by this cauſe,

which is ſenſible in teleſcopes of a ſmall aperture, increaſes in ſo great a proportion, viz. as the cubes of the diameters, that it ſeemed impoſſible to increaſe the power of dioptric teleſcopes greatly, without extending them to a very inconvenient length, unleſs this confuſion of colours could be corrected.

4. It was known that different tranſparent bodies poſſeſſed different degrees of refractive power; and, until Mr Dollond diſcovered the contrary, it was ſuppoſed, that the refractions of the coloured rays were always in a determinate ratio to one another. On this ſuppoſition it ſeemed impoſſible to correct the faults of refracting teleſcopes: for it was ſuppoſed, that if the diſperſion of light produced by a convex lens were counteracted by another lens or medium of a concave form, the refraction would be totally deſtroyed; and this indeed would be the caſe, if the two mediums were made of the ſame matter; and from ſome experiments made by Sir Iſaac Newton, this was ſuppoſed to be actually the caſe in all ſubſtances whatever.

5. From conſidering that the eyes of animals are formed of mediums of different colours, it occurred firſt to Mr David Gregory, the celebrated profeſſor of aſtronomy at Oxford, and then to Mr Euler, that, by a combination of mediums which had different refractive powers, it might be poſſible to remedy the imperfections of dioptric teleſcopes. It does not, however, appear, that either of theſe gentlemen underſtood the true principle on which theſe phenomena depend. Mr Euler executed his idea by forming a compound object lens from two glaſs lenſes with water interpoſed, but his attempt was not attended with ſucceſs. Mr Dollond, however, was led by ſome arguments adduced by Mr Klingeſternia, to repeat one of Sir Iſaac Newton's experiments, and which had induced even that great philoſopher himſelf to ſuppoſe that the improvement afterwards executed by Mr Dollond was impoſſible. This experiment was made by Sir Iſaac Newton, by placing a glaſs priſm within a priſmatic veſſel filled with water, in ſuch a manner that the rays of light which were refracted by the glaſs priſm ſhould paſs through and be refracted in a contrary direction by the water priſm. In this manner the refraction of the light was entirely deſtroyed. But when Mr Dollond repeated the experiment, he found, that contrary to his own expectations, when the angles of the two priſms were ſo proportioned that they counteracted each other's mean refraction, then colours appeared; and on the other hand, when they were ſo proportioned, that the diſperſion of the coloured rays was counteracted, the mean refraction ſtill ſubſiſted; which evidently proved, that the mean refractive and diſperſive powers of glaſs and water were not proportional to one another.

6. To apply this to the propoſed improvement, Mr Dollond examined ſeveral kinds of glaſs. Crown-glaſs was found to poſſeſs the ſmalleſt diſperſive power in proportion to its refraction; while flint-glaſs poſſeſſed the greateſt diſperſive power in proportion to its refraction, which was alſo very great. On comparing theſe two exactly together, he found, that a wedge of white flint glaſs whoſe angle was about 25 degrees, and another of crown-glaſs whoſe angle was 29 degrees, refracted very nearly alike. He found alſo, that, when the wedges were ground to ſuch angles, the refraction produced by the flint-glaſs was to that produced by the crown-glaſs nearly as two to three, the refracted light was then free from colour. On meaſuring the general refracting powers of theſe two glaſſes, he found that in flint-glaſs, the ſine of incidence to the rays was to the ſine of mean refraction as 1 to 1.583; and that, in crown-glaſs, the ſine of incidence was to the ſine of mean refraction as 1 to 1.53.

The methods of determining the different refractive powers of glaſs are given under the article Optics. Here we ſhall only obſerve, that two kinds of glaſs are neceſſary for the conſtruction of achromatic teleſcopes; one of which ſhall poſſeſs as ſmall, and the other as great, diſperſive powers, relative to their mean refracting powers, as can be procured. The difference of glaſſes in this reſpect depends on the quality of the ingredients employed in their compoſition. Crown-glaſs, which is compoſed of ſand melted by means of the aſhes of ſea-weeds, barilla, or kelp, both which fluxes are known to conſiſt of vegetable earth, alkali, and neutral ſalt, is found to give the ſmalleſt diſperſive power. Plate glaſs, which conſiſts of ſand melted by means of fixed vegetable alkali, with little or no vegetable earth, gives a greater diſperſive power; but both theſe give much leſs than flint-glaſs, which conſiſts of ſand melted by means of minium and fixed alkali. It appears, therefore, that the diſperſion of the rays is greateſt when minium, or probably other metallic calces, are made uſe of; and that alkalies give a greater power of diſperſion than vegetable or other earths. Mr Zieher of Peterſburgh, however, informs us, that he has made a kind of glaſs, much ſuperior in this reſpect to flint-glaſs; but it does not as yet appear, whether it be more fit for optical purpoſes than that commonly made uſe of. There ſeems no difficulty in augmenting the diſperſive power, as that is found to depend on the quantity of minium or other flux: but thus we unfortunately increaſe alſo the capital fault to which flint-glaſs and all compoſitions of that kind are ſubject; namely, the being ſubject to veins or ſmall threads running through it. By theſe, even when ſo ſmall as to be imperceptible to the naked eye, the rays which fall on them are diverted from their proper direction, and thereby render the images confuſed. This is owing to the greater denſity of the veins, as appears by their image being received on white paper, when the glaſs is held between the paper and the ſun or a candle, at a proper diſtance. The rays of light being then made to converge by the ſuperior denſity of the veins, their images will appear as bright lines bordered with obſcure edges on the paper. Flint-glaſs is ſo much ſubject to this kind of imperfection, that it is with difficulty the opticians can pick out pieces of the ſize commonly uſed from a large quantity of the glaſs. It is farther to be regretted, that the minium which produces the greateſt diſperſive power, is likewiſe the very ſubſtance which renders flint-glaſs much more ſubject to theſe imperfections than any other. The reaſon is, that the ſand and earthy matters mix uniformly in fuſion; and, having not only a conſiderable degree of affinity towards each other, but alſo being not much different from each other, they are not apt to ſeparate. On the other hand, when ſuch an heavy ſubſtance as minium is added to theſe earthy ſubſtances, though it has a pretty ſtrong tendency to unite with the earthy ſubſtances, it has none with the fixed alkali, which is another ingredient in this glaſs. Hence ſome parts of the glaſs will contain more metallic matter than the reſt; particularly near the bottom of the pot, which is ſo full of large veins as to be applied only to the making of wares of little value. The veins in this caſe are formed by the deſcent of the minium to the bottom, which in its paſſage forms threads or veins by dragging other parts of the glaſs along with them.

The correction of this fault appears therefore to be very difficult. M. Macquer informs us, that he had in vain tried to remove it by a very long fuſion and a fierce fire; which indeed others have found by experience not to correct, but augment the evil. Mr Keir is of opinion that ſome new compoſition muſt be diſcovered, which, along with a ſufficient refractive power, ſhould poſſeſs a greater uniformity of texture; but he is likewiſe of opinion, that ſcarce any alteration in this reſpect could be made without injuring the colour of the glaſs. For optical purpoſes, however, our author does not think that an alteration in the colour of the ingredients would be very detrimental. "I am convinced (ſays he), that glaſſes ſenſibly tinged with colour, might tranſmit as much or more light than the beſt flint-glaſs. For the colourleſs appearance of flint-glaſs is an optical deception. The minium gives it a conſiderable tinge of yellow, and the alkali inclines it to a bluiſh caſt, beſides the colour ariſing from a greater or leſs impurity of the materials; ſo that the glaſs would actually be very ſenſibly coloured, unleſs by the addition of manganeſe, which is known to give a purpliſh red. Thus the other tinges are counteracted, but not effaced or deſtroyed as has been frequently imagined. By the mixture of the three principal colours, red, yellow, and blue, more or leſs exactly counterpoiſed, a certain dark ſhade is introduced, in which, as not any one of the colours predominates, no coloured tinge appears, but the effect is merely a diminution of the tranſparency of the glaſs, which, however, is too ſmall for ordinary obſervation." Mr Keir is even of opinion, that a certain tinge of yellow would in many caſes be of ſervice, becauſe it would exclude ſome of the blue rays, which being moſt refrangible are moſt injurious to the diſtinctneſs of viſion.

Very conſiderable difficulties, however, muſt ariſe in attempting improvements of this kind; as the experiments muſt all be tried on a very large ſcale. This is not only attended with a very heavy expence in itſelf on account of the quantity of materials employed, but from the heavy duty of exciſe which is rigorouſly exacted whether the glaſs be manufactured into ſaleable articles or not. It is obſerved in the manufacture of every kind of glaſs, that the glaſs in the middle of the area or tranverſe ſection of a pot is much purer and freer from veins and other imperfections than the part which is near the ſides, and that the glaſs at the bottom is the worſt of all. Conſequently it is chiefly in large pots, ſuch as are uſed in manufactures, that there is a probability of ſucceſs. Very fine and beautiful glaſſes, called *paſte* and *artificial gems*, may be made in ſmaller pots or crucibles; but this glaſs is ſuffered to cool and ſubſide in the veſſel, by which means the contiguous parts are more uniform in their texture than can be expected in a piece of glaſs taken out of the pot while hot in the common way, by making it adhere and twiſt round an iron rod or pipe. But although the method of allowing the glaſs to cool in the pots is very advantageous for the purpoſes of the jeweller, it is by no means applicable to thoſe of the optician. Glaſs cooled in that gradual manner, ſuffers ſome degree of cryſtallization or peculiar arrangement of its parts; the conſequence of which is, that the rays of light undergo certain refractions independent on the form of the glaſs, which greatly affect the diſtinctneſs of viſion in teleſcopes.

Muſical GLASS. See HARMONICA.

Looking GLASS. *See* LOOKING *Glaſs*, MIRROR and FOLIATING.

Burning GLASS. See BURNING *Glaſs*.

Weather GLASS. See BAROMETER.

Cupping GLASS. See SURGERY.

Hour GLASS. See HOUR *Glaſs*.

Watch GLASS. See WATCH.

Glaſs-Wort. See SALSOLA.

GLASTONBURY, a town of Somerſetſhire in England; ſeated in W. Long. 2. 46. N. Lat. 51. 15. —It is noted for a famous abbey, ſome magnificent ruins of which are ſtill remaining; but they are every day diminiſhing for the ſake of the ſtones. However, the curious ſtructure called *the Abbot's kitchen* is ſtill pretty entire, and is of a very unuſual contrivance. The monks pretend that it was the reſidence of Joſeph of Arimathea, and of St Patrick; but for this aſſertion they produce no good authority. The king of the Weſt Saxons erected a church here, which he and the ſucceeding kings enriched to ſuch a degree, that the abbot lived like a prince, had the title of *lord*, and ſat among the barons in parliament; and no perſon, not even a biſhop or prince, durſt ſet foot on the iſle of Avalon, in which the abbey ſtands, without his leave. The revenue of the abbey was above 4,000l. *per ann.* beſides ſeven parks well ſtocked with deer. The laſt abbot (Richard Whiting), who had 100 monks, and 300 domeſtics, was hanged in his pontificals, with two of his monks, on the Tor, a high hill in the neighbourhood, for refuſing to take the oath of ſupremacy to Henry VIII. and ſurrender his abbey when required. Edgar and many other Saxon kings were buried here; and, as ſome will have it, Arthur the Britiſh king. Every cottage here has a part of a pillar, a door, or a window of this fabric; of which there ſtill remain the ruins of the choir, the middle tower, and chapels. The walls that remain of the abbey are overgrown with ivy, and the aſpect of the whole is both melancholy and venerable. Here are two pariſh churches This town, while under the protection of its abbots, was a parliamentary borough, but it loſt that and its privilege of a corporation; the latter of which was, however, reſtored by queen Anne, who granted it a new charter for a mayor and burgeſſes. The only manufactory here is ſtockings, but the chief ſupport of the place is the reſort of the people to ſee the ruins of the abbey. The George Inn here was formerly called the *Abbot's Inn*; becauſe it was a receptacle for the ſtrollers that came in pilgrimage to the abbey. At a little diſtance from the old-church and facing the monk's church-yard are two remarkable pyramids, with inſcriptions, that are in characters unintelligible, and an image in biſhop's veſtments.—The ſtory of the Glaſtonbury thorn, and of its budding always upon Chriſtmas-day, is well known: however that circumſtance is falſe; though if the winter is mild, it always buds about the latter end of December, but later if the weather is ſevere.

GLATZ, a handſome and ſtrong town of Bohemia, and capital of a county of the ſame name. It is ſeated on the river Neiſſe; and has ſtrong fortifications, with a caſtle built upon a mountain. The county was ceded to the king of Pruſſia by the queen of Hungary in 1742; and is about 45 miles in length, and 25 in breadth. It has mines of pit-coal, ſilver, and iron; good quarries, plenty of cattle, and fine ſprings of mineral water. The town is ſituated in E. Long. 15. 16. N. Lat. 50. 25.

GLAUBER (John Rhodolphus), a celebrated German chemiſt, who flouriſhed about the year 1646. He wrote a great number of different treatiſes on chemiſtry, ſome of which have been tranſlated into Latin and French. All his works have been collected into one volume, intitled, *Glauberus concentratus*, which has been tranſlated into Engliſh, and was printed at London, in folio, in 1689.

Glauber's Salts. See Chemistry-*Index*.

GLAUCOMA, in medicine and ſurgery, the name of a diſeaſe in the eye, wherein the cryſtalline humour is turned of a bluiſh or greeniſh colour, and its tranſparency hereby diminiſhed.—The word comes from γλαυκος, *cæſius*, "ſea-green, ſky-coloured, or greyiſh."

Thoſe in whom this diſorder is forming, diſcover it hence, that all objects appear to them as through a cloud or miſt; when entirely formed, the viſual rays are all intercepted, and nothing is ſeen at all.

It is reckoned incurable, when inveterate, and in aged perſons; and even under other circumſtances, is very difficult of cure, externals proving of little ſervice.

The internals beſt ſuited, are thoſe uſed in the gutta ſerena. Jul. Cæſar Claudinus, Conſul. 74. gives a remedy for the glaucoma.

The glaucoma is uſually diſtinguiſhed from the cataract or ſuffuſion, in this, that in the cataract the whiteneſs appears in the pupil, very near the cornea; but it ſhows deeper in the glaucoma.

Some late French authors, however, maintain the cataract and glaucoma to be one and the ſame diſeaſe. According to them the cataract is not a film, or pellicle, formed before the pupil, as had always been imagined; but an inſpiſſation or induration of the humour itſelf, whereby its tranſparency is prevented; which brings the cataract to the glaucoma. According to Mr. Sharp, the glaucoma of the ancient Greeks is the preſent cataract; but M. St Yves ſays it is a cataract accompanied with a gutta ſerena.. See Surgery.

GLAUCUS, a marine god, or deity of the ſea. There are a great many fabulous accounts of this divinity: but the poetical hiſtory of him is, that before his deification, he was a fiſherman of the town of Anthedon, who having one day taking a conſiderable number of fiſhes which he laid upon the bank, on a ſudden perceived that theſe fiſhes, having touched a kind of herb that grew on the ſhore, received new ſtrength, and leaped again into the ſea; upon the ſight of which extraordinary accident, he was tempted to taſte of the herb himſelf, and preſently leaped into the ſea after them, where he was metamorphoſed into a Triton, and became one of the ſea-gods,

GLAUX, in botany: A genus of the monogynia order belonging to the pentandria claſs of plants; and in the natural method ranking under the 17th order, *Calycanthemæ*. The calyx is monophyllous; there is no corolla; the capſule is unilocular, quinquevalved, and pentaſpermous.

GLAZIER, an artificer who works in glaſs.—The principal part of a glazier's buſineſs conſiſts in fitting panes of glaſs to the ſaſhes and window-frames of houſes, pictures, &c. and in cleaning the ſame.

GLAZING, the cruſting over earthen ware by a vitreous ſubſtance, the baſis of which is lead. See Glass *of Lead*.

The workers of common earthen ware, however, are not at the trouble of thus previouſly making a pure glaſs of lead. Their uſual compoſition for glazing their ware is formed of white ſand 40 pounds, of red lead 20 pounds, of pearl-aſhes 20 pounds, and of common ſalt 12 pounds. Powder the ſand by grinding it, and then add it to the other ingredients and grind them together: after which calcine them for ſome time with a moderate heat, and when the mixture is cold, pound it to powder; and when wanted for uſe temper it with water. The proportion of theſe ingredients may be occaſionally varied. The ware, after being turned on the wheel and dried in the open air, is covered over with the above compoſition by means of a bruſh; and when ſet in the furnace the violent heat ſoon reduces it to a perfect glaſs, covering the whole internal and external ſurface of the veſſel.

We may obſerve, however, in general, that lead ought to be excluded from the compoſition of glazings, and other fluxes ſubſtituted in its ſtead. A tranſparent glazing may be prepared without lead by calcining 40 pounds of white ſand, 25 pounds of pearl-aſhes, and 15 pounds of common ſalt; and proceeding as before: and a more perfect tranſparent glazing may be made of ſand 40 pounds, of wood-aſhes perfectly burnt 50 pounds, of pearl-aſhes 10 pounds, and of common ſalt 12 pounds. The following recipes are taken for the moſt part from Kunckel, who ſays that they are the true glazings uſed at Delft and other Dutch manufactories.

Black is made of eight parts of red-lead, iron filings three, copper-aſhes three, and zaffer two meaſures. This when melted will make a brown-black; and if you want it blacker, add more zaffer to it.

Blue is thus prepared: Take lead-aſhes or red lead one pound, clear-ſand or powdered flints two pounds, common ſalt two pounds, white calcined tartar one pound, Venice or other glaſs half a pound, zaffer half a pound; mix them well together and melt them for ſeveral times, quenching them always in cold water. If you would have it fine and good, it will be proper to put the mixture into a glaſs furnace for a day or two.

Another blue glazing may be formed of one pound of tartar, a quarter of a pound of red-lead, half an ounce of zaffer, and a quarter of a pound of powdered flints, which are to be fuſed and managed as in the laſt recipe. Or, take two pounds of calcined lead and tin, and five pounds of common ſalt, five pounds of powdered flints, and of zaffer, tartar, and Venetian glaſs, each one pound. Calcine and fuſe the mixture as before. Or, again, take of red-lead one part, of ſand three parts, and of zaffer one part. For a violet blue glazing, take four ounces of tartar, two ounces of red-lead, five ounces of powdered flints, and half a dram of manganeſe.

Brown is made of red-lead and flints of each 14 parts, and of manganeſe two parts fuſed; or of red-lead 12 parts, and manganeſe one part fuſed. A brown glazing, to be laid on a white ground, may be made of manganeſe two parts, and of red-lead and white-glaſs of each one part, twice fuſed.

Fleſh-coloured is made of 12 parts of lead aſhes, and one of white-glaſs.

Gold-coloured. Take of litharge three parts, of ſand or calcined flint one part; pound and mix theſe very well together, then run them into a yellow glaſs with a ſtrong fire. Pound this glaſs and grind it into a ſubtile powder, which moiſten with a well ſaturated ſolution of ſilver; make it into a paſte, which put into a crucible, and cover it with a cover. Give at firſt a gentle degree of fire; then increaſe it, and continue it till you have a glaſs, which will be green. Pound this glaſs again, and grind it to a fine powder; moiſten this powder with ſome beer, ſo that by means of an hair pencil you may apply it upon the veſſels or any piece of earthen ware. The veſſels that are painted or covered over with this glazing muſt be firſt well heated, then put under a muffle; and as ſoon as the glaſs runs, you muſt ſmoak them, by holding them over burning vegetables, and take out the veſſels. Mr Heinſius of Peterſburgh, who ſent this receipt to the Royal Society, uſes the words *afflare debes fumen*, which is rendered *ſmoak them*, in the Tranſactions. Phil. Tranſ. N. 465. § 6.

Kunckel gives ſeveral preparations for a gold coloured yellow glazing. This may be produced by fuſing a mixture of three parts of red-lead, two parts of antimony, and one part of ſaffron of Mars; by again melting the powdered maſs, and repeating the operation four times, or by fuſing four or five times a compoſition of red-lead and antimony of each an ounce, and of ſcales of iron half an ounce; or by calcining and fuſing together eight parts of red-lead, ſix parts of flints, one part of yellow ochre, one part of antimony, and one part of white glaſs. A tranſparent gold-coloured glazing may be obtained by twice fuſing red-lead and white-flints, of each 12 parts, and of filings of iron one part.

Green may be prepared of eight parts of litharge or red-lead, eight parts of Venice glaſs, four parts of braſs-duſt or filings of copper: or of ten parts of litharge, twelve of flint or pebble, and one of *us æſtum* or copper-aſhes.—A fine green glazing may be produced by fuſing one part of the Bohemian granate, one part of filings of copper, one part of red-lead, and one part of Venetian glaſs; or by fuſing one part of white glaſs, the ſame quantity of red-lead, and alſo of filings of copper; powdering the maſs, and adding one part of Bohemia granate to two parts of this powder. A fine green may be obtained by mixing and grinding together any part of the yellow glazings with equal quantities of the blue glazings, and all the ſhades and teints of green will be had by varying the proportion of the one to the other, and by the choice of the kind of yellow and blue.

Sea-green is made of five pounds of lead-aſhes, one pound of tin-aſhes, three pounds of flint, three quarters of a pound of ſalt, half a pound of tartar, and half a pound of copper-duſt.

Iron-colour is prepared of 15 parts of lead-aſhes or red-lead, 14 of white-ſand or flints, and five of calcined copper. This mixture is to be calcined and fuſed.

Liver-colour is prepared of 12 parts of litharge, eight of ſalt, ſix of pebble or flint, and one of manganeſe.

Purple-brown conſiſts of lead-aſhes 15 parts, clean ſand or powdered flints 18 parts, manganeſe one part, and white-glaſs 15 meaſures, to which ſome add one meaſure of zaffer.

Red is made of antimony three pounds, litharge or red-lead three, and ruſt of iron one; grind them to a fine powder. Or, take two pounds of antimony, three of red-lead, and one of calcined ſaffron of Mars, and proceed as before.

White. The white glazing for common ware is made of 40 pounds of clear ſand, 75 pounds of litharge or lead-aſhes, 26 of pot-aſhes, and 10 pounds of ſalt: theſe are three times melted into a cake, quenching it each time in clear cold water. Or it may be made of 50 pounds of clean ſand, 70 of lead-aſhes, 30 of wood-aſhes, and 12 of ſalt.

For a fine white: Take two pounds of lead and one of tin; calcine them to aſhes: of this take two parts, calcined flint, white ſand, or broken white glaſs, one part, and ſalt one part: mix them well together and melt them into a cake for uſe. The trouble of calcining the tin and lead may be prevented by procuring them in a proper ſtate.

A very fine white glazing may be obtained by calcining two parts of lead and one part of tin; and taking one part of this maſs, and of flints and common ſalt of each one part, and fuſing the mixture.

A white glazing may be alſo prepared by mixing 100 pounds of maſticot, 60 pounds of red-lead, 20 pounds of calcined tin or putty, and 10 pounds of common ſalt, and calcining and powdering the mixture ſeveral times.

Yellow is prepared of red-lead three pounds; calcined antimony and tin of each two pounds; or, according to ſome, of equal quantities of the three ingredients. Theſe muſt be melted into a cake, then ground fine: and this operation repeated ſeveral times; or it may be made of 15 parts of lead-ore, three parts of litharge of ſilver, and 15 parts of ſand.—A fine yellow glazing may be procured by mixing five parts of red-lead, two parts of powdered brick, one part of ſand, one part of the white glazings, and two parts of antimony, calcining the mixture and then fuſing it. Or, take four parts of white-glaſs, one part of antimony, three parts of red-lead, and one part of iron-ſcales, and fuſe the mixture; or fuſe 16 parts of flints, one part of iron-filings, and 24 parts of litharge. A light yellow glazing may be produced with ten parts of red-lead, three parts of antimony, and three of glaſs, and two parts of calcined tin. See *Gold colour*, above.— *A citron yellow* is made of ſix parts of red-lead, ſeven parts of fine red brick-duſt, and two parts of antimony. This mixture muſt be calcined day and night for the ſpace of four days, in the aſh-hole of a glaſs-houſe furnace, and at laſt urged to fuſion.

For the glazing of Delft-ware, Porcelain, Stone-ware, were, &c. ſee the articles *Delft-Ware*, Porcelain, and Pottery.

The Romans had a method of glazing their earthen veſſels, which in many reſpects appears to have been ſuperior to ours. The common brown glazing eaſily ſcales off, cracks, and in a ſhort time becomes diſagreeable to the eye. Beſides, it is very eaſily deſtroyed by acids; nor can veſſels glazed in this manner be even employed to hold water, without part of it oozing through their pores. Lead is alſo very deſtructive to the human body; and if acids are unwarily put into veſſels glazed with lead, the liquors will receive a very dangerous impregnation from the metal. The Roman glazing, which is yet to be ſeen upon urns dug up in ſeveral places, appears to have been made of ſome kind of varniſh; and Pliny gives us a hint that it was made of bitumen. He tells us that it never loſt its beauty, and that at length it bcame cuſtomary to glaze ſtatues in this manner. As this varniſh ſunk deep into the ſubſtance of the ware it was not ſubject to thoſe cracks and flaws which disfigure our veſſels; and as it was not liable to be corroded by acids, it could not be ſubject to any of the accidents which may enſue from the uſe of veſſels glazed with lead.

GLEAD, or Glade, a name uſed in the northern parts of Britain for the kite. See Falco.

GLEAM is popularly uſed for a ray or beam of light. Among falconers a hawk is ſaid to gleam when ſhe caſts or throws up filth from the gorge.

GLEANING, the act of gathering or picking up the ears of corn left behind after the field has been reaped and the crop carried home. By the cuſtoms of ſome countries, particularly thoſe of Melun and Eſtampes, all farmers and others are forbid, either by themſelves or ſervants, to put any cattle into the fields, or prevent the gleaning in any manner whatever for the ſpace of 24 hours after the carrying off the corn, under the penalty of confiſcation.

GLEBE, among miners, ſignifies a piece of earth in which is contained ſome mineral ore.

Glebe, in law, the land belonging to a pariſh-church beſides the tithes.

GLECHOMA, Ground-ivy: a genus of the gymnoſpermia order, belonging to the didynamia claſs of plants; and in the natural method ranking under the 42d order, *Verticillatæ*. Each part of the antheræ come together in the form of a croſs; the calyx is quinquefid. There are three ſpecies: the moſt remarkable of which is the hederacea, or common ground-ivy, which is ſo well known that it requires no deſcription. Many virtues were formerly attributed to this plant, which it is now found not to be poſſeſſed of. Some, however, it has. The leaves are thrown into the vat with ale to clarify it and give it a flavour. Ale thus prepared is often drunk as an antiſcorbutic. The expreſſed juice mixed with a litle wine, and applied morning and evening, deſtroys the white ſpecks upon horſes eyes. The plants that grow near it do not flouriſh. It is ſaid to be hurtful to horſes if they eat much of it. Sheep eat it, horſes are not fond of it; cows, goats, and ſwine, refuſe it.

GLEDITSIA, triple-thorned acacia, or *Honey-locuſt*: A genus of the diœcia order, belonging to the polygamia claſs of plants; and in the natural method ranking under the 33d order, *Lomentaceæ*. The hermaphrodite calyx is quadrifid; the corolla tetrapetalous; the ſtamina ſix, one piſtil and legumen. The male calyx is pentaphyllous; the corolla tripetalous; with ſix ſtamina. The female calyx is pentaphyllous; the corolla pentapetalous; one piſtil and legumen. There are two ſpecies.

1. The triacanthos, a native of Virginia and Penſylvana, is of an upright growth, and its trunk is guarded by thorns of three or four inches in length in a remarkable manner. Theſe thorns have alſo others coming out of their ſides at nearly right angles: Their colour is red. The branches are ſmooth, and of a white colour. Theſe are likewiſe armed with red thorns, they are proportionally ſmaller: they are of ſeveral directions, and at the ends of the branches often ſtand ſingle. The young ſhoots of the preceding ſummer are perfectly ſmooth, of a redddiſh green, and retain their leaves often until the middle of November. Although there is a peculiar oddity in the nature and poſition of the ſpines, yet the leaves conſtitute the greateſt beauty of theſe trees: they are doubly pinnated, and of a delightful ſhining green. The pinnated leaves, that form the duplication, do not always ſtand oppoſite by pairs on the middle rib; the pinnæ of which they are compoſed are ſmall and numerous; no leſs than 10 or 11 pair belong to each of them; and as no leſs than four or five pair of ſmall leaves are arranged along the middle rib, the whole compound leaf conſiſts often of more than 200 pinnæ of this fine green colour: They ſit cloſe, and ſpread open in fine weather; though during bad weather they will droop, and their upper ſurfaces nearly join, as if in a ſleeping ſtate. The flowers are produced from the ſides of the young branches in July: They are a greeniſh catkin, and make little ſhow; though many are ſucceeded by pods, that have a wonderful effect; for theſe are exceedingly large, more than a foot, ſometimes a foot and a half in length, and two inches in breadth, and of a nut-brown colour when ripe; ſo that the effect they occaſion, when hanging on the ſides of the branches, may eaſily be gueſſed.—There is a variety of this ſpecies, with fewer thorns, ſmaller leaves, and oval pods. It has nearly the reſemblance of the other; though the thorns being not ſo frequent, and the pods being ſmaller, each containing only one ſeed, this ſort loſes that ſingular effect which the other produces by them.

Theſe trees are eaſily propagated. Europeans receive the ſeeds from America in the ſpring, which keep well in the pods, and are for the moſt part good. They generally arrive in February, and, as ſoon as poſſible after, they ſhould be ſown in a well-ſheltered warm border of light ſandy earth. If no border is to be found that is naturally ſo, it may be improved by applying drift ſand and making it fine. The ſeeds ſhould be ſown about half an inch deep; and they will for the moſt part come up the firſt ſpring. If the ſummer ſhould prove dry, they muſt be conſtantly watered; and if ſhade could be afforded them in the heat of the day, they would make ſtronger plants by the autumn. A careful attention to this article is peculiarly requiſite; for as the ends of the branches are often killed, if the young plant has not made ſome progreſs, it will be liable to be wholly deſtroyed by the winter's froſt without protection; and this renders the ſowing the ſeeds in a warm border, under an hedge, in a well-ſheltered place neceſſary; for there theſe ſhrubs will endure the winters, even when ſeedlings, and ſo will require no farther trouble; nay, though the tops ſhould be nipped, they will ſhoot out again lower, and will ſoon overcome it. It will be proper to let them remain two years in the ſeed-bed before they are planted out in the nurſery. The ſpring is the beſt time for the work. Their diſtances ſhould be one foot by two; the rows ſhould be dug between every winter; and, being weeded in ſummer, here they may remain, with no other particular care, until they are ſet out to remain. Theſe trees are late in the ſpring before they exhibit their leaves, but keep ſhooting long in the autumn.

2. The other ſpecies is the inermis, the ſtem of which is unarmed or without thorns. It is a native of South America, and in this country requires to be kept in a ſtove.

GLEET, in medicine, the flux of a thin limpid humour from the urethra. See the index ſubjoined to MEDICINE.

GLENDALAGH, otherwiſe called *the Seven Churches*, anciently a celebrated town of Ireland, ſituated five miles north weſt of Rothdrum, in the county of Wicklow, and province of Leinſter. The name ſignifies "the valley of the two lakes." In this valley, ſurrounded by high and almoſt inacceſſable mountains, St Kevin or Cavin, called alſo *St Coemgene*, about the middle of the 6th century, founded a monaſtery, which in a ſhort time from the ſanctity of its founder was much reſorted to, and at length became a biſhopric and a religious city. St Kevin died 3d June 618, aged 120; and on that day annually numbers of perſons flock to the Seven Churches to celebrate the feſtival of that venerated ſaint. During the middle ages the city of Glendalagh, called by Hovedon *Epiſcopatus Biſtagnenſis;* was held in great eſteem, and received ſeveral valuable donations and privileges, its epiſcopal juriſdiction extending to the walls of Dublin.—About the middle of the 12th century, on ſome account or other, it was much neglected by the clergy; and became, inſtead of a holy city, a den of thieves, wherefore Cardinal Papiro, in 1214, united it to the ſee of Dublin, which union was confirmed by king John. The O'Tools, chiefs of Firthuathal, however, by the aſſiſtance of the Pope, continued long after this period to elect biſhops and abbots to Glendalagh, though they had neither revenues or authority, beyond the diſtrict of Tuathal, which was the weſtern part of the county of Wicklow; in conſequence of which the city was ſuffered to decay, and had become nearly a deſart, in 1497, when Dennis White, the laſt titular biſhop, ſurrendered his right in the cathedral church of St Patrick, Dublin. From the ruins of this ancient city ſtill remaining, it appears to have been a place of conſequence, and to have contained ſeven churches and religious houſes; ſmall indeed, but built in a neat elegant ſtyle, in imitation of the Greek architecture: the cathedral, the walls of which are yet ſtanding, was dedicated to St Peter and St Paul. South of the cathedral ſtands a ſmall church roofed with ſtone, nearly entire; and in ſeveral parts of the valley are a number of ſtone croſſes, ſome of which are curiouſly carved, but without any inſcriptions. In the north-weſt corner of the cemetery belonging to the cathedral ſtands a round tower, 95 feet high, and 15 in diameter; and in the cemetery of a ſmall church, on the ſouth ſide of the river, near the great lake, called the *Rheſeart church*, are ſome tombs, with Iriſh inſcriptions, belonging to the O'Tools. In a perpendicular projecting rock on the ſouth ſide of the great lake, 30 yards above the ſurface of the water, is the celebrated bed of St Kevin, hewn out of the rock, exceedingly difficult of acceſs and terrible in proſpect. Amongſt the ruins have been diſcovered a number of ſtones, curiouſly carved, and containing inſcriptions in the Latin, Greek, and Iriſh languages. As this city was in a valley, ſurrounded on all ſides except the eaſt, by high, barren, and inacceſſible mountains, the artificial roads leading thereto are by no means the leaſt curious part of the remains; the principal is that leading into the county of Kildare through Glendaſon. This road for near two miles is yet perfect, compoſed of ſtones placed on their edges, making a firm and durable pavement about 10 feet broad. At a ſmall diſtance from St Kevin's bed, on the ſame ſide of the mountain, are to be ſeen the ruins of a ſmall ſtone building called *Saint Kevin's cell.*

GLENOIDES, the name of two cavities, or ſmall depreſſions, in the inferior part of the firſt vertebra of the neck.

GLICAS, or GLYCAS, (Michael), a Greek hiſtorian about the middle of the 15th century, lived in Sicily, and wrote annals of what paſſed from the creation of the world to the death of Alexis Comnenus, in 1118. Leunclavius added to it a fifth part, which carries it down to the taking of Conſtantinople. Glicas was alſo the author of ſeveral uſeful and curious letters.

GLIMMER, or GLIST. See MICA.

GLINUS, in botany: A genus of the pentagynia order, belonging to the decandria claſs of plants; and in the natural method ranking under the 22d claſs, *Caryophyllei.* The calyx is pentaphyllous; there is no corolla; the nectarium is compoſed of bifid briſtles; the capſule is quinqueangular, quinquelocular, quinquevalved, and polyſpermous.

GLIRES, the name of Linnæus's fourth order of mammalia. See ZOOLOGY.

GLISSON (Francis) a learned Engliſh phyſician in the 17th century, was educated at Cambridge, and was made regius profeſſor of that univerſity. In 1634 he was admitted a fellow of the college of phyſicians in London. During the civil wars, he practiſed phyſic at Colcheſter, and afterwards ſettled in London. He greatly improved phyſic by his anatomical diſſections and obſervations, and made ſeveral new diſcoveries of ſingular uſe towards eſtabliſhing a rational practice. He wrote, 1. *De rachitide*, &c. 2. *De lymphæductis nuper repertis;* with the *Anatomica prolegomena, & Anatomia hepatis.* 3. *De naturæ ſubſtantia energetica; ſeu de via vitæ naturæ, ejuſque tribus primis facultatibus*, &c. quarto. 4. *Tractatus de ventriculo & inteſtinis*, &c. The world is obliged to him for the *capſula communis*, or *vagina portæ.*

GLISTER, in ſurgery. See Clyster.

GLOBBA, in botany: A genus of the monogynia order, belonging to the monandria claſs of plants. The corolla is equal and trifid; the calyx trifid above; the capſule trilocular, with many ſeeds.

GLOBE, in geometry, a round or ſpherical body more uſually called a *ſphere*. See Sphere.

Globe, is more particularly uſed for an artificial ſphere of metal, plaſter, paper, or other matter; on whoſe convex ſurface is drawn a map, or repreſentation either of the earth or heavens, with the ſeveral circles conceived thereon. See Geography.

Globes are of two kinds *terreſtrial* and *celeſtial*; each of very conſiderable uſe, the one in aſtronomy, and the other in geography, for performing many of the operations thereof in an eaſy obvious manner, ſo as to be conceived without any knowledge of the mathematical grounds for thoſe arts.

The fundamental parts, common to both globes, are an axis, repreſenting that of the world; and a ſpherical ſhell, or cover, which makes the body of the globe, on the external ſurface of which the repreſentation is drawn. See Axis, Pole, &c.

Globes, we have obſerved, are made of different materials, viz. ſilver, braſs, paper, plaſter, &c. Thoſe commonly uſed are of plaſter and paper; The conſtruction whereof is as follows:

Conſtruction of Globes.—A wooden axis is provided, ſomewhat leſs than the intended diameter of the globe; and into the extremes hereof two iron wires are driven for poles: this axis is to be the beam, or baſis of the whole ſtructure.

On the axis are applied two ſpherical or rather hemiſpherical caps, formed on a kind of wooden mould or block.—Theſe caps conſiſt of paſteboard, or paper, laid one lay after another, on the mould, to the thickneſs of a crown-piece; after which, having ſtood to dry and embody, making an inciſion along the middle, the two caps thus parted are ſlipped off the mould.

They remain now to be applied on the poles of the axis, as before they were on thoſe of the mould: and to fix them in their new place, the two edges are ſewed together with pack-thread, &c.

The rudiments of the globe thus laid, they proceed to ſtrengthen and make it ſmooth and regular. In order to this, the two poles are haſped in a metalline ſemicircle of the ſize intended; and a kind of plaſter, made of whiting, water, and glue, heated, melted, and incorporated together, is daubed all over the paper-ſurface. In proportion as the plaſter is applied, the ball is turned round in the ſemicircle, the edge whereof pares off whatever is ſuperfluous and beyond the due dimenſion, leaving the reſt adhering in places that are ſhort of it. After ſuch application of plaſter, the ball ſtands to dry; which done, it is put again in the ſemicircle, and freſh matter applied: thus they continue alternately to apply the compoſition, and dry it, till ſuch time as the ball every where accurately touches the ſemicircle; in which ſtate it is perfectly ſmooth, regular, firm, &c.

The ball thus finiſhed, it remains to paſte the map or deſcription thereon: in order to this, the map is projected in ſeveral gores, or guſſets; all which join accurately on the ſpherical ſurface, and cover the whole ball. To direct the application of theſe gores, lines are drawn by a ſemicircle on the ſurface of the ball, dividing it into a number of equal parts, correſponding to thoſe of the gores, and ſubdividing thoſe again anſwerably to the lines and diviſions of the gores.

The papers thus paſted on, there remains nothing but to colour and illuminate the globe; and to varniſh it, the better to reſiſt duſt, moiſture, &c.—The globe itſelf thus finiſhed, they hang it in a braſs meridian, with an hour-circle, and a quadrant of altitude; and thus fit it into a wood horizon.

To deſcribe the gores, or guſſets, for the globes. In Chamber's Dictionary, the following method is directed.

Plate CCXXI.

“ 1. From the given diameter of the globe, find a right line AB, fig. 1. equal to the circumference of a great circle, and divide it into twelve equal parts.

2. Through the ſeveral points of diviſion, 1, 2, 3, 4, &c. with the interval of ten of them, deſcribe arches mutually interſecting each other in D and E; theſe figures or pieces duly paſted or joined together will make the whole ſurface of the globe.

3. Divide each part of the right line AB into 30 equal parts, ſo that the whole line AB, repreſenting the periphery of the equator, may be divided into 360 degees.

4. From the poles D and E, fig. 2. with the interval of 23½ deg. deſcribe arches *a b*; theſe will be twelfth-parts of the polar circles.

5. After the like manner, from the ſame poles D and E, with the interval of 66½ deg. reckoned from the equator, deſcribe arches *c d*; theſe will be twelfth-parts of the tropics.

6. Through the degree of the equator *e*, correſponding to the right aſcenſion of any given ſtar, and the poles D and E, draw an inch of a circle; and taking in the compaſſes the complement of the declination from the pole D, deſcribe an arch interſecting it in *i*: this point *i* will be the place of that ſtar.

7. All the ſtars of a conſtellation being thus laid down, the figure of the conſtellation is to be drawn according to Bayer, Hevelius, or Flamſtead.

8. Laſtly, after the ſame manner are the declinations and right aſcenſions of each degree of the ecliptic *d g* to be determined.

9. The ſurface of the globe thus projected on a plane is to be engraven on copper, to ſave the trouble of doing this over again for each other.

10. A ball, in the mean time, is to be prepared of paper, plaſter, &c. as before directed, and of the intended diameter of the globe; on this, by means of a ſemicircle and ſtyle, is the equator to be drawn; and through every 30th degree a meridian. The ball thus divided into twelve parts, correſponding to the ſegments before projected, the latter are to be cut from the printed paper, and paſted on the ball.

11. Nothing now remains but to hang the globe as before in a braſen meridian and wooden horizon; to which may be added a quadrant of altitude made of braſs, and divided in the ſame manner as the ecliptic and equator.

If the declinations and right aſcenſions of the ſtars be not given, but the longitudes and latitudes in lieu thereof, the ſurface of the globe is to be projected after the ſame manner as before; except that, in this caſe, D and E, fig. 2. are the poles of the ecliptic, and *f h* the ecliptic itſelf; and that the polar circles and tropics with the equator *g d*, and the parallels thereof, are to be determined from their declinations.

M. De La Lande, in his *Aſtronomie* 1771, *Tom.* 3. *p.* 736, relates the following methods. "To conſtruct celeſtial and terreſtrial globes, gores muſt be engraved, which are a kind of projection, or incloſure of the globe (fig. 3.) ſimilar to what is now to be explained. The length PC of the axis of the curve is equal to a quarter of the circumference of the globe; the intervals of the parallels on the axis PC are all equal, the radii of the circles KDI which repreſent the parallels are equal to the cotangents of the latitudes, and the arches of each, as DI, are nearly equal to the number of the degrees of the breadth of the gore (which is uſually 30°) multiplied by the ſine of the latitude; thus, there will be found no intricacy in tracing them; but the difficulty proceeds from the variation found in the trial of the gores when paſting them on the globe, and of the quantity that muſt be taken from the paper, leſs on the ſides than in the middle; (becauſe the ſides are longer) to apply it exactly to the ſpace that it ſhould cover.

"The method uſed among workmen to delineate the gores, and which is deſcribed by Mr Bion (*Uſage des Globes*, *Tome* 3.) and by Mr Robert de Vaugondy in the 7th volume of the *Encylopèdie* is little geometrical, but yet is ſufficient in practice. Draw on the paper a line AC, equal to the chord of 30°, to make the half breadth of the gore; and a perpendicular PC, equal to three times the chord of 30°, to make the half length: for theſe papers, the dimenſions of which will be equal to the chords, become equal to the arcs themſelves when they are paſted on the globe. Divide the height CP into 9 parts, if the parallels are to be drawn in every 10°: divide alſo the quadrant BE into 9 equal parts through each diviſion point of the quadrant as G; and through the correſponding point D of the right line CP draw the perpendiculars HGF and DF, the meeting of which in F gives one of the points of the curve BEP, which will terminate the circumference of the gore. When a ſufficient number of points are thus found, trace the outline PIB with a curved rule. By this conſtruction are given the gore breadths, which are on the globe, in the ratio of the coſines of the latitudes; ſuppoſing theſe breadths taken perpendicular to CD, which is not very exact, but it is impoſſible to preſcribe a rigid operation ſufficient to make a plane which ſhall cover a curved ſurface, and that on a right line AB ſhall make lines PA, PC, PB, equal among themſelves, as they ought to be on the globe. To deſcribe the circle KDI which is at 30° from the equator: there muſt be taken above D a point which ſhall be diſtant from it the value of the tangent of 60°, taken out either from the table, or on a circle equal to the circumference of the globe to be traced; the point will ſerve as a centre for the parallel DI, which ſhould paſs through the point D, for it is ſuppoſed equal to that of a cone circumſcribing the globe, and which would touch at the point D.

"The meridians may be traced to every 10 degrees, by dividing each parallel, as KI, into three parts at the points L and M, and drawing from the pole P, through all theſe diviſion points, curves, which repreſent the intermediate meridians between PA and PB, (as BR and ST, fig. 4.). The ecliptic AQ may be deſcribed by means of the known declination from different points of the equator that may be found in a table; for 10°, it is 3° 58′; for 20°, 7° 50′=BQ; for 30°, 11° 29′, &c."

It is obſerved in general, that the paper on which charts are printed, ſuch as the *colombier*, ſhortens itſelf $\frac{1}{71}$ part of a line in ſix inches upon an average, when it is dried after printing; this inconvenience muſt therefore be corrected in the engraving of the gores: if notwithſtanding that, the gores are found too ſhort, it muſt be remedied by taking from the ſurface of the ball a little of the white with which it is covered; thereby making the dimenſions ſuitable to the gore as it was printed. But what is ſingular is, that in drawing the gore, moiſtened with the paſte to apply on the globe, the axis GH lengthens, and the ſide AK ſhortens, in ſuch a manner, that neither the length of the ſide ACK nor that of the axis GEH of the gore are exactly equal to the quarter of the circumference of the globe, when compared to the figure on the copper, or to the numbered ſides ſhown in fig. 4. Mr Bonne having made ſeveral experiments on the dimenſions that gores take after they had been parted ready to apply to the globe, and particularly with the paper named *jeſus* that he made uſe of for a globe of one foot in diameter, found that it was neceſſary to give to the gores, on the copper, the dimenſions ſhown in fig. 4. Suppoſing that the radius of the globe contained 720 parts, the half breadth of the gore is AG=$181\frac{5}{10}$, the diſtance AC for the parallel of 10 degrees taken on the right line LM is 128.1, the ſmall deviation from the parallel of 10 degrees in the middle of the gore ED is 4, the line ABN is right, the radius of the parallel of 10° or of the circle CEF is 4083, and ſo of the others as marked in the figure. The ſmall circular cap which is placed under H, has its radius 253 inſtead of 247, which it would have if the ſine of 20° had been the radius of it.

For the uſes, &c. of the globes, ſee Geography and Astronomy, with the plates there referred to.

Globe Animal. See Animalcule, n° 29.

Globe-Fiſh. See Ostracion.

GLOBULARIA, Globular blue daisy: A genus of the monogynia order, belonging to the tetrandria claſs of plants; and in the natural method ranking under the 48th order, *Aggregatæ*. The common calyx is imbricated; the proper one tubulated inferior; the upper lip of the florets bipartite, the under one tripartite; the receptacle paleaceous. There are ſeveral ſpecies; but only one is commonly to be met with in our gardens, viz. the vulgaris, or common blue daiſy. It hath broad thick radical leaves three parted at the ends, upright ſtalks from about ſix to 10 or 12 inches high garniſhed with ſpear-ſhaped leaves, and the top crowned by a globular head of fine blue flowers compoſed of many florets in one cup. It flowers in June, and makes a good appearance; but thrives beſt in a moiſt ſhady ſituation. It is propagated by parting the roots in September.

GLOBULE, a diminutive of globe, frequently uſed by phyſicians in ſpeaking of the red particles of the blood. See Blood.

Gloceſter.

GLOCESTER, the capital of Gloceſterſhire in England, 101 miles from London. It is an ancient city; and by Antoninus is called *Clevum*, or *Glevum*, which Cambden thinks was formed from the Britiſh *Caer-Glowe*, ſignifying "a fair city." It was one of the 28 cities built by the Britons before the arrival of the Romans. By the Romans it was made one of their colonies, and in the eighth century it was eſteemed one of the nobleſt cities in the kingdom. It has ſuffered conſiderably by fire at different periods. It ſtands upon a hill; and from the middle of the city, where the four principal ſtreets meet, there is a deſcent every way, which makes it not only clean and healthy, but adds to the beauty of the place. Forging of iron ſeems to have been its manufactory ſo early as the time of William the Conqueror. King Henry VIII. made it the ſee of a biſhop, with a dean and ſix prebends. Its caſtle, which was erected in the time of William the Conqueror, is very much decayed: part of it is leaſed out by the crown; and the reſt ſerves for a priſon, one of the beſt in England. In its cathedral, which is an ancient but magnificent fabric, and has a tower reckoned one of the moſt curious pieces of architecture in England, are the tombs of Robert duke of Normandy, ſon to William the Conqueror, and of Edward II. and there is a wiſpering-place like to that of St Paul's at London. In the chapter-houſe lies Strongbow who conquered Ireland. There are 12 chapels in it, with the arms and monuments of many great perſons. King John made it a borough to be governed by two bailiffs. Henry III. who was crowned here, made it a corporation. By its preſent charter from Charles I. it is governed by a ſteward, who is generally a nobleman; a mayor; a recorder; 12 aldermen, out of whom the mayor is choſen; a town-clerk; 2 ſheriffs, choſen yearly out of 26 common councilmen; a ſword-bearer; and four ſerjeants at mace. Here are 12 incorporated trading companies, whoſe maſters attend the mayor on all public occaſions, &c. Beſides the cathedral, there are five pariſh churches in this city; which is likewiſe well provided with hoſpitals, particularly an infirmary upon the plan of thoſe at London, Wincheſter, Bath, &c. Here is a good ſtone-bridge over the river Severn, with a quay, wharf, and cuſtomhouſe; but moſt of its buſineſs is engroſſed by Briſtol. King Edward I. held a parliament here in 1272, wherein ſome good laws were made, now called the *Statutes of Gloceſter*; and he erected a gate on the ſouth ſide of the abbey, ſtill called by his name, though almoſt demoliſhed in the civil wars. King Richard II. alſo held a parliament here: and King Richard III. in conſideration of his having (before his acceſſion to the crown) borne the title of *Duke of Gloceſter*, added the two adjacent hundreds of Dudſton and King's Barton to it, gave it his ſword and cap of maintenance, and made it a county of itſelf by the name of the *county of the city of Gloceſter*. But after the reſtoration the hundreds were taken away by act of parliament, and the walls pulled down; becauſe the city ſhut the gates againſt Charles I. when he beſieged it in 1643: by which, though the ſiege was raiſed by the earl of Eſſex, it had ſuffered 20,000l. damage, having 241 houſes deſtroyed, which reduced it ſo much that it has ſcarce recovered its former ſize and grandeur. Before that time it had 11 pariſh churches, but ſix of them were then demoliſhed. Here are abundance of croſſes, and ſtatues of the Engliſh kings, ſome of whom kept their Chriſtmas here; ſeveral market-houſes ſupported with pillars; and large remains of monaſteries, which were once ſo numerous, that it gave occaſion to the monkiſh proverb, *as ſure as God is in Gloceſter*. Here is a barley market; and a hall for the aſſizes, called the *Booth-hall*. Its chief manufacture is pins. In this branch it is aſtoniſhing the number of people who are employed, there being at leaſt 14 or 15 different proceſſes. Under the bridge is a water engine to ſupply the town, and it is ſerved with it alſo from Robin Hood's well, to which is a fine walk from the city. Camden ſays, that the famous Roman way, called *Ermin-ſtreet*, which begins at St David's in Pembrokeſhire, and reaches to Southampton, paſſes through this city. Sudmead in the neighbourhood is noted for horſe-races. The markets here are on Wedenſday and Sunday; and fairs April 5th, July 5th, September 28th, and November 28th, the latter chiefly for fat hogs. Here is a charity-ſchool for above 80 children, of whom above 70 are alſo cloathed; and a well endowed blue-coat ſchool. The city ſends two members to parliament. The duke of Gloceſter is next brother to George III.

Gloceſter-ſhire.

GLOCESTERSHIRE, a county of England, is bounded on the Weſt by Monmouthſhire and Herefordſhire, on the north by Worceſterſhire, on the eaſt by Oxfordſhire and Warwickſhire, and on the ſouth by Wiltſhire and part of Somerſetſhire. It is ſixty miles in length, twenty ſix in breadth, and one hundred and ſixty in circumference; containing 1,100,000 acres, 26,760 houſes, 162,560 inhabitants, 290 pariſhes, 140 are impropriations, 1229 villages, 2 cities, and 28 market-towns. It ſends only 8 members to parliament, 6 for three towns, viz. Gloceſter, Tewkeſbury, and Cirenceſter; and 2 for the county. Its manufactures are woollen cloths of various kinds, mens hats, leather, pens, paper, bar-iron, edge-tools, nails, wire, tinned-plates, braſs, &c.: and of the principal articles of commerce of the county, it exports cheeſe 8900 tons; bacon, grain, cyder, 5000l. worth; perry, fiſh, 4000l. worth, &c. It lies in the dioceſe that takes its name from the capital, and in the Oxford circuit. The air of the county is very wholeſome, but the face of it is very different in different parts: for the eaſtern part is hilly, and is called *Cotteſwold*; the weſtern woody, and called the *Foreſt of Dean*; and the reſt is a fruitful valley, through which runs the river Severn. This river is in ſome places between two and three miles broad, and its courſe through the country, including its windings, is not leſs than ſeventy miles. The tide of flood, called the *Boar*, riſes very high, and is very impetuous. It is remarkable, that the greateſt tides are one year at the full moon, and the other at the new; one year the night-tides, and the next the day. This river affords a noble conveyance for goods and merchandiſe of all ſorts to and from the county; but it is watered by ſeveral others, as the Wye, the Avon, the Iſis, the Leden, the Frome, the Stroud, and Windruſh, beſides leſſer ſtreams, all abounding with fiſh, the Severn in particular with ſalmon, conger-ells, and lampreys. The ſoil is in general very fertile, though pretty much diverſified, yielding plenty of corn, paſture, fruit, and wood. In the hilly part of the county, or Cotteſwold, the air is ſharper than in the lowlands; and the ſoil, though not ſo fit for grain, produces excellent paſture for ſheep; ſo that of the four hundred thouſand that are computed to be kept in the county, the greater part are fed here. Of theſe ſheep the wool is exceeding fine; and hence it is that this ſhire is ſo eminent for its manufacture of cloth, of which fifty thouſand pieces are ſaid to have been made yearly, before the practice of clandeſtinely exporting Engliſh wool became ſo common. In the vale, or lower part of the county, through which the Severn paſſes, the air and ſoil are very different from thoſe of the Cotteſwold: for the former is much warmer, and the latter richer, yielding the moſt luxuriant paſtures; in conſequence of which, numerous herds of black cattle are kept, and great quantities of that excellent cheeſe, for which it is ſo much celebrated, made in it. The remaining part of the county, called the *Foreſt of Dean*, was formerly almoſt entirely over-run with wood, and extended 20 miles in length and 10 in breadth. It was then a neſt of robbers, eſpecially towards the Severn; but now it contains many towns and villages, conſiſting chiefly of miners, employed in the coal-pits, or in digging for or forging iron-ore, with both which the foreſt abounds. Theſe miners have their particular laws, cuſtoms, courts, and judges; and the king, as in all royal foreſts, has a ſwain-mote for the preſervation of the vert and veniſon. This foreſt was anciently, and is ſtill, noted for its oaks, which thrive here ſurpriſingly; but as there is a prodigious conſumption of wood in the forges, it is continually dwindling away. A navigable canal is made from Stroud to Framilode, forming a junction between the Severn and Thames. Its chalybeat ſprings are; St Anthony's well, in Abbenhall pariſh; at Barrow and Maredon, in Bodington pariſh; at Aſh-Church, near Tewkeſbury; at Dumbleton, near Winchcomb; at Eaſington, near Durſley; and at Cheltenham. Its ancient fortifications attributed to the Romans, Saxons, or Danes, are at Abſton and Wick, and at Dointon, Dixton, Addleſthorp, Knole, Over Upton, Hanham, Bodington, and Bourton on the Water.

GLOCHIDION, in botany: A genus of the ſyngeneſia order, belonging to the monœcia claſs of plants. There is no calyx; the corolla conſiſts of ſix egg-ſhaped concave petals; the ſtamina are three very ſmall inconſpicuous filaments; the antheræ cylindric and erect; the female flowers have no calyx; the corolla is parted into ſix; the pericarpium is a depreſſed roundiſh capſule with ſix cells; the ſeeds are roundiſh and ſolitary.

GLOGAW, a ſtrong and conſiderable town of Germany, in Sileſia, and capital of a duchy of the ſame name. It is not very large, but is well fortified on the ſide of Poland. It has a handſome caſtle, with a tower, in which ſeveral counſellors were condemned by Duke John, in 1498, to periſh with hunger. Beſides the Papiſts, there are a great number of Proteſtants and Jews. It was taken by aſſault, by the king of Pruſſia, in 1741, and the garriſon made priſoners. After the peace in 1742, the king of Pruſſia ſettled the ſupreme court of Juſtice here, it being, next to Breſlaw, the moſt populous place in Sileſia. It is ſeated on the river Oder, in E. Long. 15. 13. N. Lat. 51. 40.

GLOGAW *the* LESS, a town of Sileſia, in the duchy of Opelen, now in poſſeſſion of the king of Pruſſia. It is two miles S. E. of great Glogaw, and 45 N. W. of Breſlaw. E. Long. 16. 15. N. Lat. 51. 38.

GLORIA PATRI, among eccleſiaſtical writers. See DOXOLOGY.

GLORIOSA, SUPERB LILY: A genus of the monogynia order, belonging to the hexandria claſs of plants; and in the natural method ranking under the 11th order, *Sarmentaceæ*. The corolla is hexapetalous, undulated, and reflected; the ſtyle oblique. There is but one ſpecies, a native of Malabar. It hath a thick, fleſhy, tuberous root, ſending forth from its centre declinated round ſtalks growing eight or ten feet long, and garniſhed with very long narrow leaves running out into a point, terminated by a long tendril. From the upper part of the ſtalks proceed large flame-coloured drooping flowers, conſiſting of ſix widely-ſpreading reflected petals. It flowers in June and July; and is of admirable beauty, whence its name of *Glorioſa*, or Superb Lily.—This plant being a native of a very warm climate, requires the protection of a hot houſe in this country. The flower-ſtalks ſhoot forth in March or April; which being long and trailing, muſt have tall ſticks placed for their ſupport. The plants are propagated by offsets, which are produced in tolerable plenty, and may be ſeparated any time after the ſtalks decay, or in ſpring before new ones ariſe.

GLORY, renown or celebrity. The love of renown, or deſire of fame and reputation, appears to be one of the principal ſprings of action in human ſociety. Glory therefore is not to be contemned, as ſome of the ancient philoſophers affected to teach: but it imports us to regulate our purſuit after it by the dictates of reaſon; and if the public approbation will not follow us in that courſe, we muſt leave her behind. We ought to have our judgements well inſtructed as to what actions are truly glorious; and to remember, that in every important enterpriſe, as Seneca obſerves, *Recte facti feciſſe merces eſt; officii fructus ipſum officium eſt*: "The reward of a thing well done, is to have done it; the fruit of a good office is the office itſelf." Thoſe who by other methods ſcatter their names into many mouths, ſhow they rather hunt after a great reputation than a good one, and their reward is oftener infamy than fame.

Men generally, and almoſt inſtinctively, affix glory only to ſuch actions as have been produced by an innate deſire for public good; and we meaſure it by that degree of influence which any thing done has upon the common happineſs.

If the actions of the hero conduct ſooneſt to glory and with the greateſt ſplendor, and if the victorious general is ſo great after a ſignal engagement; it is becauſe the ſervice he has done is for the moment, and for all; and becauſe we think, without reflecting, that he has ſaved our habitations, our wealth, and our children, and every thing that attaches us to life. If the man of ſcience, who in his ſtudy has diſcovered and calculated the motions of the heavenly bodies, who in his alembics has unveiled ſome of the ſecrets of nature, or who has exhibited to mankind a new art, riſes to fame with leſs noiſe; it is becauſe the utility which he procures is more widely diffuſed; and is often of leſs ſerleſs ſervice to the preſent than to ſucceeding generations.

The conſequences, therefore, of theſe two advantages are as oppoſite as the cauſes are different; and while the benefits procured by the warrior appear to have no more influence, and while his glory becomes obſcure, that of a celebrated writer or inventor ſtill increaſes, and is more and more enlarged. His works every day bring back his name to that age which uſes them, and thus ſtill add to his celebrity and fame.

This poſthumous fame indeed has been decried by ſome writers. In particular, the author of the *Religion of Nature delineated*, has treated it as highly irrational and abſurd. "In reality (ſays he) the man is not known ever the more to poſterity, becauſe his name is tranſmitted to them: He doth not live, becauſe his name does. When it is ſaid, Julius Cæſar ſubdued Gaul, conquered Pompey, &c. it is the ſame thing as to ſay, the conqueror of Pompey was Julius Cæſar; i. e. Cæſar and the conqueror of Pompey is the ſame thing; Cæſar is as much known by one deſignation as by the other. The amount then is only this, that the conqueror of Pompey conquered Pompey; or ſomebody conquered Pompey; or rather, ſince Pompey is as little known now as Cæſar, ſomebody conquered ſomebody. Such a poor buſineſs is this boaſted immortality! and ſuch is the thing called glory among us! To diſcerning men this fame is mere air, and what they deſpiſe if not ſhun."

But ſurely it were to conſider too ſeriouſly (as Horatio ſays to Hamlet) to conſider thus. For (as the elegant author of Fitzoſburne's Letters obſerves) altho' fame with poſterity ſhould be, in the ſtrict analyſis of it, no other than what is here deſcribed, a mere unintereſting propoſition, amounting to nothing more than that ſomebody acted meritoriouſly; yet it would not neceſſarily follow, that true philoſophy would baniſh the deſire of it from the human breaſt: for this paſſion may be (as moſt certain it is) wiſely implanted in our ſpecies, notwithſtanding the correſponding object ſhould in reality be very different from what it appears in imagination. Do not many of our moſt refined and even contemplative pleaſures owe their exiſtence to our miſtakes? It is but extending ſome of our ſenſes to a higher degree of acuteneſs than we now poſſeſs them, to make the faireſt views of nature, or the nobleſt productions of art, appear horrid and deformed. To ſee things as they truly and in themſelves are, would not always, perhaps, be of advantage to us in the intellectual world, any more than in the natural. But, after all, who ſhall certainly aſſure us, that the pleaſure of virtuous fame dies with the poſſeſſor, and reaches not to a farther ſcene of exiſtence? There is nothing, it ſhould ſeem, either abſurd or unphiloſophical in ſuppoſing it poſſible at leaſt, that the praiſes of the good and the judicious, the ſweeteſt muſic to an honeſt ear in this world, may be echoed back to the manſions of the next; that the poet's deſcription of fame may be literally true, and though ſhe walks upon earth, ſhe may yet lift her head into heaven.

To be convinced of the great advantage of cheriſhing this high regard to poſterity, this noble deſire of an after-life in the breath of others, one need only look back upon the hiſtory of the ancient Greeks and Romans. For what other principle was it which produced that exalted ſtrain of virtue in thoſe days, that may well ſerve, in too many reſpects, as a model to theſe? Was it not the *conſentiens laus bonorum*, the *incorrupta vox bene judicantium* (as Tully calls it), "The concurrent approbation of the good, the uncorrupted applauſe of the wiſe," that animated their moſt generous purſuits?

In ſhort, can it be reaſonable to extinguiſh a paſſion which nature has univerſally lighted up in the human breaſt, and which we conſtantly find to burn with moſt ſtrength and brightneſs in the nobleſt and beſt-formed boſoms? Accordingly revelation is ſo far from endeavouring to eradicate the ſeed which nature has thus deeply planted, that ſhe rather ſeems, on the contrary, to cheriſh and forward its growth. To be *exalted with honour*, and to be *had in everlaſting remembrance*, are in the number of thoſe encouragements which the Jewiſh diſpenſation offered to the virtuous; and the perſon from whom the ſacred Author of the Chriſtian ſyſtem received his birth, is herſelf repreſented as rejoicing that *all generations ſhould call her bleſſed.*

GLOSS, a comment on the text of any author, to explain his ſenſe more fully and at large, whether in the ſame language or any other. See the article COMMENTARY.—The word, according to ſome, comes from the Greek γλωσσα, "tongue;" the office of a *gloſs* being to explain the text, as that of the tongue is to diſcover the mind.

GLOSS is likewiſe uſed for a literal tranſlation, or an interpretation of an author in another language word for word.

GLOSS is alſo uſed in matters of commerce, &c. for the luſtre of a ſilk, ſtuff, or the like.

GLOSSARY, a ſort of dictionary, explaining the obſcure and antiquated terms in ſome old author; ſuch are Du Cange's Latin and Greek Gloſſaries, Spelman's Gloſſary, and Kennet's Gloſſary at the end of his Parochial Antiquities.

GLOSSOPETRA, or GLOTTOPETRA, in natural hiſtory, a kind of extraneous foſſil, ſomewhat in form of a ſerpent's tongue; frequently found in the iſland of Malta and divers other parts. See Plate CC.

The vulgar notion is, that they are the tongues of ſerpents petrified; and hence their name, which is a compound of "γλωσσα, tongue," and πετρα, "ſtone." Hence alſo their traditionary virtue in curing the bites of ſerpents. The general opinion of naturaliſts is, that they are the teeth of fiſhes, left at land by the waters of the deluge, and ſince petrified.

The ſeveral ſizes of the teeth of the ſame ſpecies, and thoſe of the ſeveral different ſpecies of ſharks, afford a vaſt variety of theſe foſſil ſubſtances. Their uſual colours are black, bluiſh, whitiſh, yellowiſh, or brown; and in ſhape they uſually approach to a triangular figure. Some of them are ſimple; others are tricuſpidate, having a ſmall point on each ſide of the large one: many of them are quite ſtraight; but they are frequently found crooked, and bent in all directions; many of them are ſerrated on their edges, and others have them plain; ſome are undulated on their edges, and ſlightly ſerrated on theſe undulations. They differ alſo in ſize as much as in figure; the larger being four or five inches long, and the ſmaller leſs than a quarter of an inch.

They are moſt uſually found in the ſtrata of blue clay, though ſometimes alſo in other ſubſtances, and

and are frequent in the clay-pits of Richmond and other places. They are very frequent alſo in Germany, but no where ſo plentiful as in the iſland of Malta.

The Germans attribute many virtues to theſe foſſil teeth; they call them cordials, ſudorifics, and alexipharmics: and the people of Malta, where they are extremely plentiful, hang them about their childrens necks to promote dentition. They may poſſibly be of as much ſervice this way as an anodyne necklace; and if ſuſpended in ſuch a manner that the child can get them to its mouth, may, by their hardneſs and ſmoothneſs, be of the ſame uſe as a piece of coral.

GLOTTIS, in anatomy, the narrow ſlit at the upper part of the aſpera arteria, which is covered by the epiglottis when we hold our breath and when we ſwallow. The glottis, by its dilatation and contraction, modulates the voice. See ANATOMY, n° 116.

GLOVE, a covering for the hand and wriſt.

Gloves, with reſpect to commerce, are diſtinguiſhed into leather-gloves, ſilk-gloves, thread-gloves, cotton-gloves, worſted-gloves, &c. Leathern gloves are made of chamois, kid, lamb, doe, elk, buff, &c. Gloves in Britain now pay a duty to the king, which increaſes according to their value.

To throw the glove, was a practice or ceremony very uſual among our forefathers; being the challenge whereby another was defied to ſingle combat.—It is ſtill retained at the coronation of the Britiſh kings; when the king's champion caſts his glove in Weſtminſter hall. See CHAMPION.

Favyn ſuppoſes the cuſtom to have ariſen from the eaſtern nations, who in all their ſales and deliveries of lands, goods, &c. uſed to give the purchaſer their glove by way of livery or inveſtiture. To this effect he quotes Ruth iv. 7. where the Chaldee paraphraſe calls *glove*, what the common verſion renders by *ſhoe*. He adds, that the Rabbins interpret by *glove*, that paſſage in the cviiith Pſalm, *In Idumeam extendam calceamentum meum*, "Over *Edom* will I caſt out my ſhoe."—Accordingly, in Britain, he who took up the *glove*, declared thereby his acceptance of the challenge; and as a part of the ceremony, continues Favyn, took the *glove* off his own right hand, and caſt it upon the ground, to be taken up by the challenger. This had the force of a mutual engagement on each ſide, to meet at the time and place which ſhould be appointed by the king, parliament, or judges.—The ſame author aſſerts, that the cuſtom which ſtill obtains of bleſſing *gloves* in the coronation of the kings of France, is a remain of the eaſtern practice of giving poſſeſſion with the *glove*, l. xvi. p. 1017, &c.

Anciently it was prohibited the judges to wear gloves on the bench. And at preſent in the ſtables of moſt princes, it is not ſafe going in without pulling off the gloves.

GLOVER (Richard), the author of Leonidas and ſeveral other eſteemed works, was the ſon of Richard Glover a Hamburgh merchant in London, and was born in St Martin's-lane in the year 1712. He very early ſhowed a ſtrong propenſity to and genius for poetry; and while at ſchool, he wrote, amongſt other pieces, a poem to the memory of Sir Iſaac Newton, prefixed to the view of that incomparable author's philoſophy, publiſhed in 4to, in 1728, by his intimate friend Dr Pemberton. But though poſſeſſed of talents which were calculated to excel in the literary world, he was content to devote his attention to commerce, and at a proper period commenced a Hamburgh merchant. He ſtill, however, cultivated literature, and aſſociated with thoſe who were eminent in ſcience. One of his earlieſt friends was Matthew Green, the ingenious but obſcure author of ſome admirable poems, which in 1737, after his death, were collected and publiſhed by Mr Glover. In 1737, Mr Glover married Miſs Nunn, with whom he received a handſome fortune; and in the ſame month publiſhed Leonidas, a poem in 4to, which in this and the next year paſſed through three editions. This poem was inſcribed to Lord Cobham; and on its firſt appearance was received by the world with great approbation, though it has ſince been unaccountably neglected. Lord Lyttleton, in a popular publication called Common Senſe, and in a poem addreſſed to the author, praiſed it in the warmeſt terms; and Dr Pemberton publiſhed, Obſervations on Poetry, eſpecially epic, occaſioned by the late poem upon Leonidas, 1738, 12mo, merely with a view to point out its beauties. In 1739, Mr Glover publiſhed "London, or the Progreſs of Commerce," 4to; and a ballad intitled, Hoſier's Ghoſt. Both theſe pieces ſeem to have been written with a view to incite the public to reſent the miſbehaviour of the Spaniards; and the latter had a very conſiderable effect. The political diſſenſions at this time raged with great violence, and more eſpecially in the metropolis; and at different meetings of the livery on theſe occaſions, Mr Glover was always called to the chair, and acquitted himſelf in a very able manner, his conduct being patriotic and his ſpeeches maſterly. His talents for public ſpeaking, his knowledge of political affairs, and his information concerning trade and commerce, ſoon afterwards pointed him out to the merchants of London as a proper perſon to conduct their application to parliament on the ſubject of the neglect of their trade. He accepted the office; and in ſumming up the evidence gave very ſtriking proofs of his oratorial powers. This ſpeech was pronounced Jan. 27. 1742.

In the year 1745 died the Ducheſs of Marlborough, and by her will left to Mr Glover and Mr Mallet 500 l. each, to write the Hiſtory of the Duke of Marlborough's Life. This bequeſt, however, never took place. It is ſuppoſed that Mr Glover very early renounced his ſhare of it; and Mallet, though he continued to talk of performing the taſk almoſt as long as he lived, is now known never to have made the leaſt progreſs in it. About this period Mr Glover withdrew a good deal from public notice, and lived a life of retirement. He had been unſucceſsful in his buſineſs; and with a very laudable delicacy had preferred an obſure retreat to popular obſervation, until his affairs ſhould put on a more proſperous appearance. He had been honoured with the attention of Frederic Prince of Wales, who once preſented him with a complete ſet of the Claſſics, elegantly bound; and, on his abſenting himſelf for ſome time on account of the embarraſſment in his circumſtances, ſent him, it is ſaid, 500l. The prince died in March 1751; and in May following Mr Glover was once more drawn from his retreat by the importunity of his friends, and ſtood candidate for the place of chamberlain of London. It unfortunately happened that he did not declare himſelf until moſt of the livery had engaged their votes ; by which means he loſt his election.

In 1753, Mr Glober produced at Drury-lane his tragedy of Boadicea ; which was acted nine nights, in the month of December. It had the advantage of the performance of Mr Garrick, Mr Moſſop, Mrs Cibber, and Mrs Prichard. From the prologue it ſeems to have been patronized by the author's friends in the city ; and Dr Pemberton wrote a pamphlet to recommend it.—In 1761, Mr Glover publiſhed Medea, a tragedy written on the Greek model ; but it was not acted until 1767, when it appeared for the firſt time on the ſtage at Drury-lane for Mrs Yates's benefit. At the acceſſion of his preſent majeſty, he appears to have ſurmounted the difficulties of his ſituation. In the parliament which was then called, he was choſen member for Weymouth, and continued to ſit as ſuch until the diſſolution of it. He about this time, intereſted himſelf about India affairs, at one of Mr Sullivan's elections ; and in a ſpeech introduced the fable of the man, horſe, and bear ; and drew this concluſion, that, whenever merchants made uſe of armed forces to maintain their trade, in would end in their deſtruction.

In 1770, the poem of Leonidas requiring a new edition, it was republiſhed in two volumes 12mo, corrected throughout, and extended from nine books to twelve. It had alſo ſeveral new characters added, beſides placing the old ones in new ſituations. The improvements made in it were very conſiderable ; but we believe the public curioſity, at this period, was not ſufficiently alive to recompenſe the pains beſtowed on this once popular performance. The calamities ariſing from the wounds given to public credit, in June 1772, by the failure of the bank of Douglas, Heron, and Co. in Scotland, occaſioned Mr Glover's taking a very active part in the ſettling thoſe complicated concerns, and in ſtopping the diſtreſs then ſo univerſally felt. In February 1774, he called the annuitants of that banking-houſe together, at the King's Arms tavern, and laid propoſals before them for the ſecurity of their demands, with which they were fully ſatisfied. He alſo undertook to manage the intereſts of the merchants and Traders of London concerned in the trade to Germany and Holland, and of the dealers in foreign linens, in their application to parliament in May 1774. Both the ſpeeches made on theſe occaſions were publiſhed in a pamphlet in that year. In the ſucceeding year he engaged on behalf of the Weſt-India merchants in their application to parliament, and examined the witneſſes and ſummed up the evidence in the ſame maſterly manner he had done on former occaſions. For the aſſiſtance he afforded the merchants in this buſineſs, he was complimented by them with a ſervice of plate, of the value of 300l. The ſpeech which he delivered in the houſe was in the ſame year printed. This, we believe, was the laſt opportunity he had of diſplaying his oratorical talents in public. Having now arrived at a period of life which demanded a receſs from buſineſs, Mr Glover retired to eaſe and independence, and wore out the remainder of his days with dignity and with honour. It is probable that he ſtill continued his attention to his muſe, as we are informed that, beſides an epic poem of conſiderable length, he has left ſome tragedies and comedies behind him in manuſcript. After experiencing for ſome time the infirmities of age, he departed this life 25th November 1785 ; leaving behind him a moſt eſtimable character as a man, a citizen, and a writer.

GLOW-WORM, in zoology. See LAMPYRIS.

GLUCKSTADT, a ſtrong and conſiderable town of Germany, in the circle of Upper Saxony, and duchy of Holſtein, with a ſtrong caſtle, and ſubject to Denmark. It is ſeated on the river Elbe, near its mouth ; E. Long. 9. 15. N. Lat. 52. 53.

GLUE, among artificers, a tenacious viſcid matter, which ſerves as a cement to bind or connect things together.

Glues are of different kinds, according to the various uſes they are deſigned for, as the common glue, glove-glue, and parchment glue ; whereof the two laſt are more properly called *ſize*.

The common or ſtrong glue is chiefly uſed by carpenters, joiners, cabinet-makers, &c. It is made of ſkins of animals, as oxen, cows, calves, ſheep, &c. ; and the older the creature is, the better is the glue made of its hide. Indeed whole ſkins are but rarely uſed for this purpoſe, but only the ſhavings, parings, or ſcraps of them ; or the feet-ſinews, &c. That made of whole ſkins, however, is undoubtedly the beſt ; as that made of ſinews is the very worſt.

The Method of Making GLUE. In making glue of parings, they firſt ſteep them two or three days in water : then, waſhing them well out, they boil them to the conſiſtence of a thick jelly ; which they paſs, while hot, through ozier-baſkets, to ſeparate the impurities from it ; and then let it ſtand ſome time, to purify it further : when all the filth and ordures are ſettled to the bottom of the veſſel, they melt and boil it a ſecond time. They next pour it into flat frames or moulds : whence it is taken out pretty hard and ſolid, and cut into ſquare pieces or cakes. They afterwards dry it in the wind, in a ſort of coarſe net ; and at laſt ſtring it, to finiſh its drying.

The glue made of ſinews, feet, &c. is managed after the ſame manner ; only with this difference, that they bone and ſcour the feet, and do not lay them to ſteep.

Of this commodity there is a very great exportation from England ; the Engliſh glue being univerſally allowed to be the beſt in Europe, partly from the excellency of the material, and partly from the ſkill of the manufacturers. Next to this is the Flander-glue. In both countries it is made by the tanners from fragments of good ſkins dried with much care. In France it is a ſeparate trade : and the glue-makers pick up their materials as they can, from the ſeveral dealers in ſkins, and boiling theſe with cow-heels make their glue ; which as they purchaſe every thing, muſt render it dear, as well as of an inferior quality. The duty on exportation is tenpence, and on importation three ſhillings and tenpence, on every hundred weight

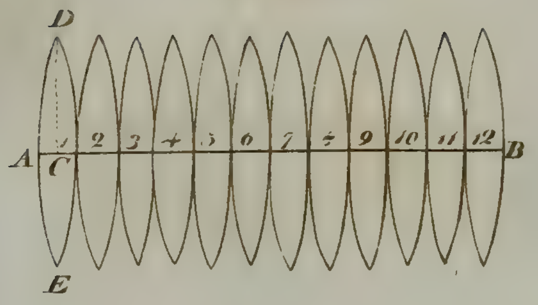
The beſt glue is that which is made from the ſkin of the oldeſt beaſt, eſpecially if a bull's hide is uſed. Experience likewiſe ſhows that glue is conſiderably improved in quality by keeping after it is made ; and the ſureſt way to try its goodneſs is to lay a piece to ſteep three or four days, and if it ſwell conſiderably, without melting, and when taken out reſumes its former dryneſs, it is excellent.

A glue that will hold againſt fire or water, it is

GLOBE.

Plate CCXXI.

Fig. 1.



Gnomon.

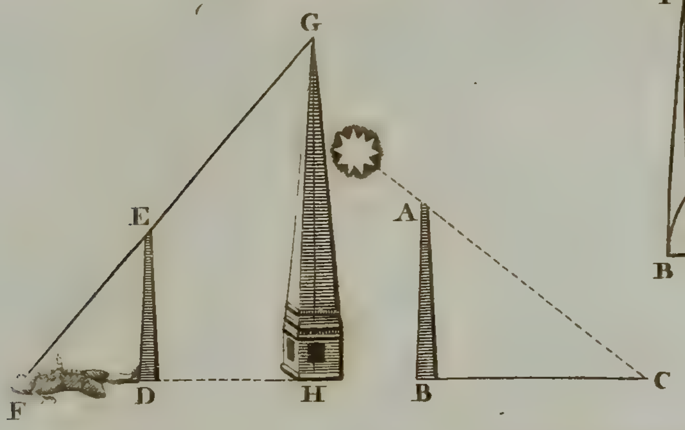


Fig. 3.

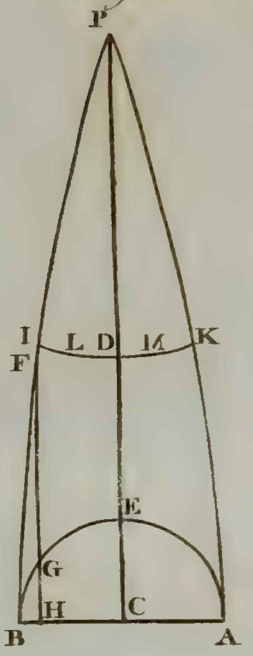


Fig. 2.

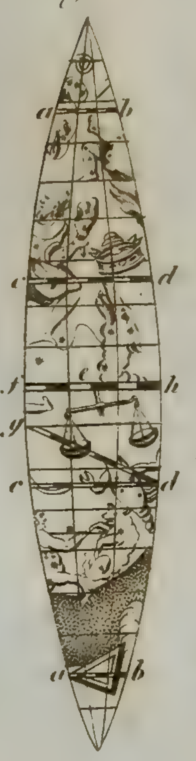
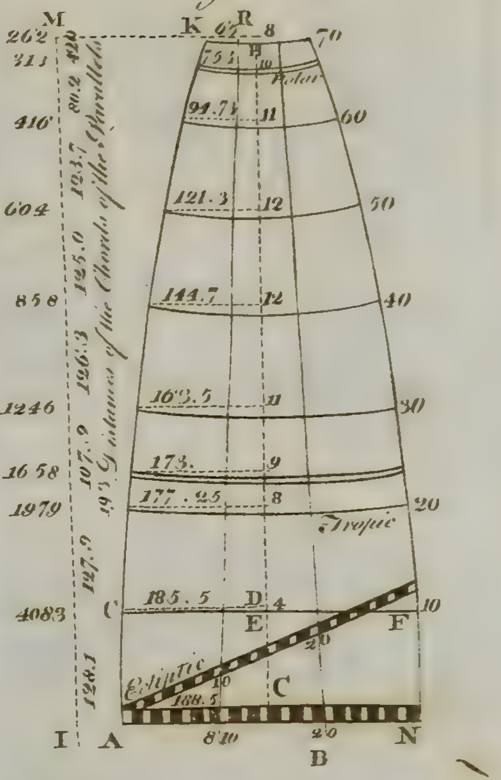
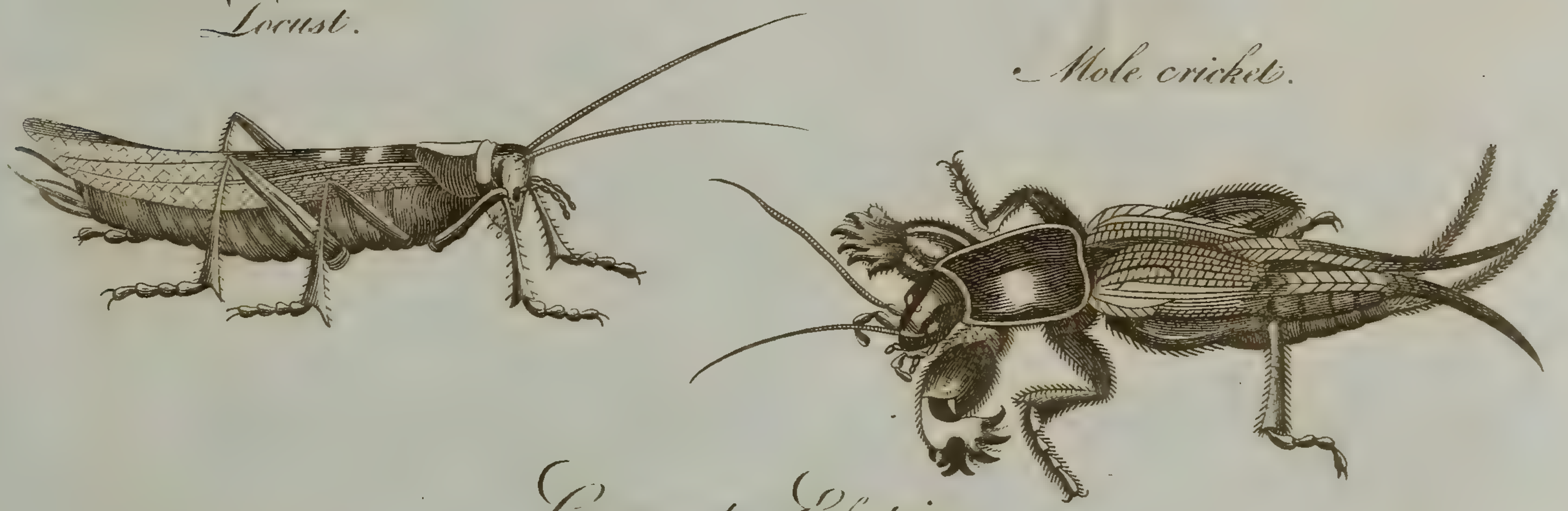


Fig. 4.



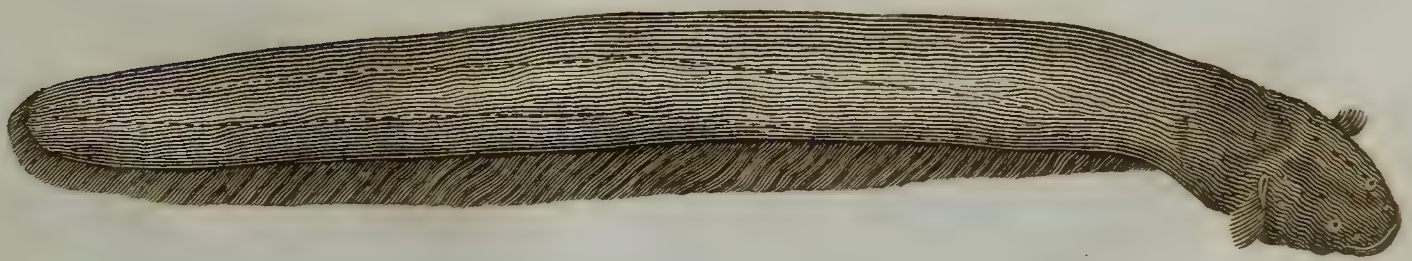
Gryllus.



Locust.

Mole cricket.

Gymnotus Electricus.



ſaid, may be made thus: Mix a handful of quicklime with four ounces of linſeed oil; boil them to a good thickneſs; then ſpread it on tin-plates in the ſhade, and it will become exceeding hard, but may be eaſily diſſolved over a fire, as glue, and will effect the buſineſs to admiration.

Neumann obſerves, that glue diſſolved in a ſolution of lapis calaminaris in ſpirt of nitre, and afterwards inſpiſſated, forms an extremely ſlippery tenacious maſs, which might be of uſe for entangling flies, caterpillars, and other inſects, if it was not too expenſive.

Method of Preparing and Uſing Glue. Set a quart of water on the fire, then put in about half a pound of good glue, and boil them gently together till the glue be entirely diſſolved and of a due conſiſtence. When glue is to be uſed, it muſt be made thoroughly hot; after which, with a bruſh dipped in it, beſmear the faces of the joints as quick as poſſible: then clapping them together, ſlide or rub them lengthwiſe one upon another, two or three times, to ſettle them cloſe; and ſo let them ſtand till they are dry and firm.—Mr Boyle gives a receipt for preparing a fine ſtrong glue from iſinglaſs in the following manner: ſteep the iſinglaſs for 24 hours in common brandy. When the menſtruum has opened and mollified the iſinglaſs, they muſt be gently boiled together, and kept ſtirring till they appear well mixed, and till a drop thereof, ſuffered too cool, turns into a ſtrong jelly. Then ſtrain it, whilſt hot, through a clean linen cloth into a veſſel to be kept cloſe ſtopped. A gentle heat ſuffices to diſſolve this glue into a tranſparent and almoſt colourleſs fluid, but very ſtrong, ſo that pieces of wood glued together with it will ſeparate elſewhere rather than in the place where they are joined. See Isinglass.

GLUME *(gluma)*, among botaniſts, a ſpecies of calyx, conſiſting of two or three membranous valves, which are often pellucid at the edges. This kind of calyx belongs to the graſſes.

GLUT, among falconers, the ſlimy ſubſtance that lies in a hawk's paunch.

GLUTA, in botany; a genus of the pentandria order, belonging to the gynandria claſs of plants. The calyx is campanulated and deciduous; there are five petals glued below to the column of the germ; and the filaments inſerted on the top of the column, on which alſo the germen ſits.

GLUTÆUS, a name common to three muſcles whoſe office is to extend the thigh. See Anatomy, *Table of the Muſcles.*

GLUTTON, in zoology. See Mustela.

GLUTTONY, a voracity of appetite, or a propenſity to gormandizing.

There is a morbid ſort of gluttony, called *fames canina*, "dog-like appetite," which ſometimes occurs, and renders the perſon ſeized with it an object of pity and of cure as in other diſeaſes: (ſee Bulimy.)—But profeſſed habitual gluttons may be reckoned amongſt the monſters of nature, and deemed in a manner puniſhable for endeavouring to bring a dearth or famine into the places where they live. For which reaſon, people think king James I. was in the right, when a man being preſented to him that could eat a whole ſheep at one meal, he aſked "What he could do more than another man?" and being anſwered "He could not do ſo much," ſaid, "Hang him then; for it is unfit a man ſhould live that eats as much as twenty men, and cannot do ſo much as one."

The emperor Clodius Albinus would devour more apples at once than a buſhel would hold. He would eat 500 figs to his breakfaſt, 100 peaches, 10 melons, 20 pound weight of grapes, 100 gnat-ſnippers, and 400 oyſters. "Fye upon him (ſaith Lipſius); God keep ſuch a curſe from the earth.

One of the Daniſh kings named *Hardiknute* was ſo great a glutton, that a hiſtorian calls him *Bacca de Porco*, "Swine's-mouth." His tables were covered four times a-day with the moſt coſtly viands that either the air, ſea, or land, could furniſh: and as he lived he died; for, revelling and carouſing at a wedding banquet at Lambeth, he fell down dead. His death was ſo welcome to his ſubjects, that they celebrated the day with ſports and paſtimes, calling it *Hock-tide*, which ſignifies ſcorn and contempt. With this king ended the reign of the Danes in England.

One Phagon, under the reign of the emperor Aurelianus, at one meal, eat a whole boar, 100 loaves of bread, a ſheep, a pig, and drank above three gallons of wine.

We are told by Fuller*, that one Nicolas Wood, of Harriſon in Kent, eat a whole ſheep of 16s. price at one meal, raw; at another time, 30 dozens of pigeons. At Sir William Sidley's, in the ſame county, he ate as much victuals as would have ſufficed 30 men. At Lord Wotton's manſion-houſe in Kent, he devoured at one dinner 84 rabbits; which, by computation, at half a rabbit a man, would have ſerved 168 men. He eat to his breakfaſt 18 yards of black pudding. He devoured a whole hog at one ſitting down; and after it, being accommodated with fruit, he eat three pecks of damoſins.

A counſellor at law, whoſe name was Mallet, well known in the reign of Charles I. eat at one time an ordinary provided in Weſtminſter for 30 men at twelve pence a piece. His practice not being ſufficient to ſupply him with better ſort of meat, he fed generally on offals, ox livers, hearts, &c. He lived to almoſt 60 years of age, and for the ſeven laſt years of his life eat as moderately as other men. A narrative of his Life was publiſhed.

GLYCINE, KNOBBED-ROOTED LIQUORICE-VETCH: A genus of the decandria order, belonging to the diadelphia claſs of plants; and in the natural method ranking under the 32d order, *Papilionaceæ*. The calyx is bilabiate; the carnia of the coralla turning back the vexillum with its point. There is but one ſpecies commonly cultivated in our gardens, viz. the fruteſcens, or Carolina kidney-bean tree. This hath ſhrubby climbing ſtalks, twining round any ſupport, 15 or 20 feet high, adorned with pinnated leaves of three pair of follicles terminated by an odd one, and from the axillas cluſters of large bluiſh purple flowers, ſucceeded by long pods like thoſe of the climbing kidney-bean. It flowers in June and July, but the ſeeds do not ripen in Britain. It is eaſily propagated, either by ſeeds exported from America, where it is native, or by layers. —The ſtalks and roots of the abrus, another ſpecies of glycine, which grows in Egypt and the Indies, are very ſweet to the taſte. Herman affirms, that the juice ob-

Lipſ. Ep. MS. 51. p. 457.

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* *Worthies*, p. 86.

tained from them by decoction is little inferior to liquorice; whence its name of *wild-liquorice* in thoſe parts of America where it is native.

GLYCIRRHIZA, Liquorice: A genus of the decandria order, belonging to the diadelphia claſs of plants; and in the natural method ranking under the 32d order, *Papilionaceæ*. The calyx is bilabiate; the upper lip tripartite, and the under one entire; the legumen ovate and compreſſed. There are two

Species 1. The glabra, or common liquorice, hath a long, thick, creeping root, ſtriking ſeveral feet deep into the ground; upright, firm, herbaceous ſtalks annually, three or four feet high, garniſhed with winged leaves of four or five pair of oval lobes, terminated by an odd one; and from the axillas erect ſpikes of pale blue flowers in July, ſucceeded by ſhort ſmooth pods. The root of this is the uſeful part, which is replete with a ſweet balſamic, pectoral juice, much uſed in all compoſitions for coughs and diſorders of the ſtomach. 2. The echinata, or prickly-poded liquorice, is nearly like the common ſort, only the ſeed-pods are prickly. Both theſe ſpecies are very hardy perennials; but the firſt is the ſort commonly cultivated for uſe, its roots being fuller of juice and ſweeter than the other. The roots are perennial; but the ſtalks riſe in ſpring and decay in autumn.

Propagation and culture. Their propagation is effected by cuttings of the ſmall roots iſſuing from the ſides of the main ones near the ſurface of the earth, dividing them into lengths of ſix or eight inches, each having one or more good buds or eyes; and the proper ſeaſon for procuring the ſets for planting is any time in open weather from October till March, though from the middle of February till the middle of March is rather the moſt ſucceſsful ſeaſon for planting. An open ſituation is the moſt ſuitable for a plantation of theſe plants. Particular regard ſhould alſo be had to the ſoil: it ought to be of a light looſe temperature, and three or four feet deep if poſſible; for the roots of the liquorice will arrive at that depth and more, and the longer the roots the more valuable they are for ſale by weight.

Having fixed on the ground, let it be trenched three ſpades deep, if the depth of proper ſoil will admit; then having your ſets ready, proceed to plant them by line and dibble, planting the ſets a foot diſtance in each row; putting them perpendicular into the ground. with the tops about an inch under the ſurface; and let the rows be a foot and a half aſunder; though the London gardeners ſeldom allow more than twelve inches between row and row. Theſe gardeners alſo ſow a crop of onions on the ſame ground the firſt year; which, as the onions root but ſlender, and ſpread but little at top, may be done without and detriment to the liquorice, or to the onions, as it does not riſe above ten or twelve inches high the firſt ſummer: obſerving to keep the ground clean from weeds during that ſeaſon by hoeing. If there is a crop of onions, uſe the ſmall hoe, cutting out the onions to four or five inches diſtance, clearing away ſuch as grow immediately cloſe to the liquorice plants; and when the onions are gathered, give the ground a thorough hoeing with a large hoe, to looſen the ſurface and deſtroy all weeds effectually; and in autumn cut down the decayed ſtalks of the liquorice, and nothing more is neceſſary to be done till ſpring; when, in February or March, give a ſlight digging between the rows; during ſpring and ſummer, keep down all weeds by broad-hoeing; and in autumn, when the ſtalks are in a decaying ſtate, cut them down to the ſurface of the earth.

In three years after planting, the roots of the liquorice will be fit to take up: and the proper ſeaſon for this is, any time from the beginning of November till February; for it ſhould neither be taken up before the ſtalks are fully decayed, nor deferred till late in ſpring, otherwiſe the roots will be apt to ſhrivel and diminiſh in weight. In taking them up, the ſmall ſide-roots are trimmed off, and the beſt divided into lengths for freſh ſets, and the main roots are tied in bundles ready for ſale. It is of advantage to ſell them as ſoon as poſſible after they are taken up, before they loſe much of their weight. They are ſold to the druggiſts from about twenty to thirty or forty ſhillings *per* hundred weight; and an acre of ground has produced three thouſand and upwards, which has been ſold for more than ſixty pounds: but the price is commonly in proportion to the goodneſs of the roots.

Uſes. The common liquorice is cultivated in moſt countries of Europe for the ſake of its root. That which is cultivated in Britain is preferable to that of moſt other countries; this laſt being generally mouldy, which this root is very apt to become, unleſs kept in a dry place. The powder of liquorice uſually ſold is often mingled with flour, and probably too often with ſubſtances not quite ſo wholeſome: the beſt ſort is of a browniſh yellow colour (the fine pale yellow being generally ſophiſticated), and of a very rich ſweet taſte, much more agreeable than that of the freſh root. Liquorice is almoſt the only ſweet that quenches thirſt; whence it was called by the Greeks *adipſon*. Galen takes notice, that it was employed in this intention in hydropic caſes, to prevent the neceſſity of drinking. Mr Fuller, in his *Medicina Gymnaſtica*, recommends this root as a very uſeful pectoral; and ſays it excellently ſoftens acrimonious humours, at the ſame time that it proves gently detergent; and this account is warranted by experience. An extract is directed to be made from it in the ſhops; but this preparation is chiefly brought from abroad, though the foreign extract is not equal to ſuch as is made with proper care among ourſelves.

GLYPH, in ſculpture and architecture, denotes any canal or cavity uſed as an ornament.

GMELIN (Dr Samuel), profeſſor at Tubingen, and afterwards member of the Imperial Academy of Sciences at St Peterſburgh, commenced his travels in June 1768; and having traverſed the provinces of Moſcow, Voronetz, New Ruſſia, Azof, Caſan, and Aſtracan, he viſited, in 1770 and 1771, the different harbours of the Caſpian, and examined with peculiar attention thoſe parts of the Perſian Provinces which border upon that ſea, of which he has given a circumſtantial account in the three volumes of his travels already publiſhed. Actuated by a zeal for extending his obſervations, he attempted to paſs through the weſtern provinces of Perſia, which are in a perpetual ſtate of warfare, and infeſted by numerous banditti. Upon this expedition he quitted, in April 1772, Einzillee, a ſmall trading place in Ghilan, upon the ſouthern ſhore of the Caſpian; and, on account of many difficulties and dangers, did not, until Dec. 2. 1773, reach Sallian, a town ſituated upon the mouth of the river Koor. Thence he proceeded to Baku and Kuba, in the province of Shirvan, where he met with a friendly reception from Ali Feth Khan, the ſovereign of that diſtrict. After he had been joined by 20 Uralian Coſſacks, and when he was only four days journey from the Ruſſian fortreſs Kiſlar, he and his companions were, on the 5th of February 1774, arreſted by order of Uſméi Khan, a petty Tartar prince, through whoſe territories he was obliged to paſs. Uſméi urged as a pretence for this arreſt, that 30 years ago ſeveral families had eſcaped from his dominions, and had found an aſylum in the Ruſſian territories; adding, that Gmelin ſhould not be releaſed until the families were reſtored. The profeſſor was removed from priſon to priſon; and at length, wearied out with continued perſecutions, he expired, July 27th, at Achmet-Kent, a village of Mount Caucaſus. His death was occaſioned partly by vexation for the loſs of ſeveral papers and collections, and partly by diſorders contracted from the fatigues of his long journey. Some of his papers had been ſent to Kiſlar during his impriſonment, and the others were not without great difficulty reſcued from the hands of the barbarian who had detained him in captivity. The arrangement of theſe papers, which will form a fourth volume of his travels, was at firſt conſigned to the care of Guldenſtaedt, but upon his death has been tranſferred to the learned Pallas.

GMELINA, in botany: A genus of the angioſpermia order, belonging to the didynamia claſs of plants; and in the natural method ranking under the 40th order, *Perſonatæ*. The calyx is nearly quadridentated; the corolla campanulated or bell ſhaped; there are two bipartite and two ſimple antheræ; the fruit is a plum with a bilocular kernel.

GNAPHALIUM, CUDWEED, GOLDY-LOCKS, ETERNAL FLOWER, &c.: A genus of the polygamia ſuperflua order, belonging to the ſyngeneſia claſs of plants; and in the natural method ranking under the 49th order, *Compoſitæ*. The receptacle is naked; the pappus feathered; the calyx imbricated, with the marginal ſcales roundiſh, parched, and coloured. There are 41 ſpecies; the moſt remarkable of which are, 1. The margaritaceum, or pearly white eternal flower, hath creeping, very ſpreading roots, crowned with broad, ſpear-ſhaped, white, hoary leaves; herbaceous thick, woolly ſtalks, a foot and an half high, branching outward, garniſhed with long, acute-pointed, white, woolly leaves, and terminated by a corymboſe cluſter of yellowiſh flowers, which appear in June and July, and are very ornamental. 2. The plantaginifolium, hath large wooly radical leaves, decumbent running roots, and herbaceous ſimple ſtalks, riſing ſix or eight inches high, terminated by a corymbus of white flowers in June, July, &c. 3. The ſtechas, hath a ſhrubby ſtalk, dividing into ſlender branches three feet long, terminated by corymboſe cluſters of yellow flowers, appearing in May and June. 4. The orientale, or oriental goldilocks, hath three varieties, with yellow, gold coloured, and white ſilvery flowers. They have ſhrubby ſtalks, riſing two or three feet high. 5. The odoratiſſimum, or ſweet-ſcented eternal flower, hath ſhrubby winged ſtalks, branching irregularly a yard high, with corymboſe cluſters of bright yellow flowers, changing to a dark yellow. 6. The arboreum, or tree gnaphalium, hath a woody ſtem, branching four or five feet high, narrow ſeſſile leaves, with revolute borders, ſmooth on their upper ſide, and roundiſh bunches of pale yellow flowers. The firſt three ſorts are hardy, and will thrive in any ſoil or ſituation. The two firſt increaſe exceedingly by their roots; and the third is eaſily propagated by ſlips. The fourth, fifth, and ſixth ſorts are ſomewhat tender; and therefore ſhould be kept in pots, to be ſheltered in a green houſe or garden frame in winter. Others may be planted in the full ground, in a dry and warm ſituation, eſpecially the oriental kind and varieties, and likewiſe the ſweet-ſcented kind; for theſe two ſpecies will ſtruggle tolerably through an ordinary winter, and make a pretty appearance during the ſummer-months. All theſe are propagated by ſlips or cuttings of their ſhoots.—The flowers of all theſe ſpecies are remarkable for retaining their beauty for years, if carefully gathered in a dry day, ſoon after they are blown.

GNAT, in zoology. See CULEX.

GNESNA, a large and ſtrong town of Great Poland, of which it is capital, and in the palatinate of Caliſh, with an archbiſhop's ſee, whoſe prelate is primate of Poland, and viceroy during the vacancy of the throne. It was the firſt town built in the kingdom, and formerly more conſiderable than at preſent. E. Long. 18. 20. N. Lat. 52. 28.

GNETUM, in botany; a genus of the adelphia order, belonging to the monœcia claſs of plants. The amentum of the male is a ſingle ſcale; there is no corolla, and but one filament with a pair of antheræ. The calyx of the female is of the ſame form; there is no corolla; the ſtyle with the ſtigma is trifid; the fruit a monoſpermous plum.

GNIDIA, in botany; a genus of the monogynia order, belonging to the octandria claſs of plants. The calyx is funnel-ſhaped and quadrifid, with four petals inſerted into it: there is one ſeed ſomewhat reſembling a berry.

GNOMES, GNOMI, certain imaginary beings, who, according to the cabbaliſts, inhabit the inner parts of the earth. They are ſuppoſed ſmall in ſtature, and the guardians of quarries, mines, &c. See FAIRY.

GNOMON, in dialling, the ſtyle, pin, or cock of a dial, which by its ſhadow ſhows the hour of the day. The gnomon of every dial repreſents the axis of the world: (See DIAL and DIALLING.)—The word is Greek, γνωμων, which literally implies ſomething that makes a thing known; by reaſon that the ſtyle or pin indicates or makes the hour known.

GNOMON, in aſtronomy, a ſtyle erected perpendicular to the horizon, in order to find the altitude of the ſun. Thus, in the right-angled triangle ABC are given, AB the length of the ſtyle, BC the length of its ſhadow, and the right angle ABC. Hence, making CB the radius, we have this analogy for finding the angle ACB, the ſun's altitude, viz. BC : AB : : radius : tangent of the angle C.

Plate CCXXI.

By means of a gnomon, the ſun's meridian altitude, and conſequently the latitude of the place, may be found more exactly than with the ſmaller quadrants. See QUADRANT.

By the ſame inſtrument the height of any object GH may be found : for as DF, the diſtance of the obſerver's eye from the gnomon, is to DE, the height of the ſtyle ; ſo is FH, the diſtance of the obſerver's eye from the object, to GH, its height.

See further on the uſes and application of Gnomons, the article Geography, nº 49—53.

Gnomon of a Globe ; the index of the hour circle.

GNOMONICS, the art of dialling. See Dialling.

GNOSTICS, ancient heretics, famous from the firſt riſe of Chriſtianity, principally in the eaſt.

It appears from ſeveral paſſages of the ſacred writings, particularly 1 John ii. 18. 1 Tim. vi. 20. and Col. ii. 8. that many perſons were infected with the gnoſtic hereſy in the firſt century ; though the ſect did not render itſelf conſpicuous, either for number or reputation, before the time of Adrian, when ſome writers erroneouſly date its riſe.

The name is formed of the Latin *gnoſticus*, and that of the Greek γνωςικος "knowing," of γινωσκω "I know ;" and was adopted by thoſe of this ſect, as if they were the only perſons who had the true knowledge of Chriſtianity. Accordingly, they looked on all other Chriſtians as ſimple, ignorant, and barbarous perſons, who explained and interpreted the ſacred writings in a too low, literal, and unedifying ſignification.

At firſt the Gnoſtics were only the philoſophers and wits of thoſe times, who formed for themſelves a peculiar ſyſtem of theology, agreeable to the philoſophy of Pythagoras and Plato ; to which they accommodated all their interpretations of ſcripture. But

Gnostics afterwards became a generical name, comprehending divers ſects and parties of heritics, who roſe in the firſt centuries, and who, though they differed among themſelves as to circumſtances, yet all agreed in ſome common principles. They were ſuch as corrupted the doctrine of the goſpel by a profane mixture of the tenets of the oriental philoſophy, concerning the origin of evil and the creation of the world, with its divine truths. Such were the Valentinians, Simonians, Carpocratians, Nicolaitans, &c.

Gnostics was ſometimes alſo more particularly attributed to the ſucceſſors of the firſt Nicolaitans and Carpocratians, in the ſecond century, upon their laying aſide the names of the firſt authors. Such as would be thoroughly acquainted with all their doctrines, reveries, and viſions, may conſult St Irenæus, Tertullian, Clemens Alexandrinus, Origen, and St Epiphanius ; particularly the firſt of theſe writers, who relates their ſentiments at large, and confutes them at the ſame time : indeed, he dwells more expreſsly on the Valentinians than any other ſort of Gnoſtics ; but he ſhows the general principles whereon all their miſtaken opinions were founded, and the method they followed in explaining ſcripture. He accuſes them with introducing into religion certain vain and ridiculous genealogies, i.e. a kind of divine proceſſions or emanations, which had no other foundation but in their own wild imagination.

In effect, the Gnoſtics confeſſed, that theſe æons or emanations were no where expreſsly delivered in the ſacred writings ; but inſiſted at the ſame time, that Jeſus Chriſt had intimated them in parables to ſuch as could underſtand him. They built their theology not only on the goſpels and the epiſtles of St Paul, but alſo on the law of Moſes and the prophets. Theſe laſt laws were peculiarly ſerviceable to them, on account of the allegories and alluſions with which they abound, which are capable of different interpretations : Though their doctrine, concerning the creation of the world by one or more inferior beings of an evil or imperfect nature, led them to deny the divine authority of the books of the Old Teſtament, which contradicted this idle fiction, and filled them with an abhorrence of Moſes and the religion he taught ; alleging, that he was actuated by the malignant author of this world, who conſulted his own glory and authority, and not the real advantage of men. Their perſuaſion that evil reſided in matter, as its centre and ſource, made them treat the body with contempt, diſcourage marriage, and reject the doctrine of the reſurrection of the body and its reunion with the immortal ſpirit. Their notion, that malevolent genii preſided in nature, and occaſioned diſeaſes and calamities, wars, and deſolations, induced them to apply themſelves to the ſtudy of magic, in order to weaken the powers or ſuſpend the influence of their malignant agents.

The Gnoſtics conſidered Jeſus Chriſt as the Son of God, and conſequently inferior to the Father, who came into the world for the reſcue and happineſs of miſerable mortals, oppreſſed by matter and evil beings : but they rejected our Lord's humanity, on the principle that every thing corporeal is eſſentially and intrinſically evil ; and therefore the greateſt part of them denied the reality of his ſufferings. They ſet a great value on the beginning of the goſpel of St John, where they fancied they ſaw a great deal of their æons or emanations under the *Word*, the *Life*, the *Light*, &c. They divided all nature into three kinds of beings, viz. *hylic*, or material ; *pſychic*, or animal ; and *pneumatic*, or ſpiritual. On the like principle they alſo diſtinguiſhed three ſorts of men ; *material*, *animal*, and *ſpiritual*. The firſt, who were material, and incapable of knowledge, inevitably periſhed, both ſoul and body ; the third, ſuch as the Gnoſtics themſelves pretended to be, were all certainly ſaved ; the pſychic, or animal, who were the middle between the other two, were capable either of being ſaved or damned, according to their good or evil actions.

With regard to their moral doctrines and conduct, they were much divided. The greateſt part of this ſect adopted very auſtere rules of life, recommended rigorous abſtinence, and preſcribed ſevere bodily mortifications, with a view of purifying and exalting the mind. However, ſome maintained, that there was no moral difference in human actions ; and thus, confounding right with wrong, they gave a looſe rein to all the paſſions, and aſſerted the innocence of following blindly all their motions, and of living by their tumultuous dictates. They ſupported their opinions and practice by various authorities : ſome referred to fictitious and apocryphal writings of Adam, Abraham, Zoroaſter, Chriſt, and his apoſtles ; others boaſted, that they had deduced their ſentiments from ſecret doctrines of Chriſt, concealed from the vulgar ; others affirmed, that they arrived at ſuperior degrees of wiſdom by an innate vigour of mind ; and others aſſerted, that they were inſtructed in theſe myſterious parts of theological ſcience by Theudas, a diſciple of St Paul, and by Matthias, one of the friends of our Lord. The tenets of the ancient Gnoſtics were revived in Spain, in the fourth century, by a ſect called the *Priſcillianiſts*.

The appellation *Gnoſtic* ſometimes alſo occurs in a good ſenſe, in the ancient eccleſiaſtical writers, and particularly Clemens Alexandrinus, who, in the perſon of his Gnoſtic, deſcribes the characters and qualities of a perfect Chriſtian. This point he labours in the ſeventh book of his Stromata, where he ſhows, that none but the Gnoſtic, or learned perſon, has any true religion. He affirms, that were it poſſible for the knowledge of God to be ſeparated from eternal ſalvation, the Gnoſtic would make no ſcruple to chooſe the knowledge; and that if God would promiſe him impunity in doing of any thing he has once ſpoken againſt, or offer him heaven on thoſe terms, he would never alter a whit of his meaſures. In this ſenſe the father uſes Gnoſtics, in oppoſition to the heretics of the ſame name; affirming, that the true Gnoſtic is grown old in the ſtudy of the holy ſcripture; and that he preſerves the orthodox doctrine of the apoſtles and of the church; whereas the falſe Gnoſtic abandons all the apoſtolical traditions, as imagining himſelf wiſer than the apoſtles. At length the name *Gnoſtic*, which originally was the moſt glorious, became infamous, by the idle opinions and diſſolute lives of the perſons who bore it.

GNU, or GNOU, in Zoology. See CAPRA, n° xiii.

GOA, a large and ſtrong town of Aſia, in the peninſula on this ſide the Ganges, and on the Malabar coaſt. It was taken by the Portugueſe in 1508, and is the chief town of all their ſettlements on this ſide the Cape of Good Hope. It ſtands in an iſland of the ſame name, about 12 miles in length, and 6 in breadth; and the city is built on the north ſide of it, having the conveniency of a fine ſalt-water river, capable of receiving ſhips of the greateſt burden, where they lie within a mile of the town. The banks of the river are beautified with a great number of handſome ſtructures; ſuch as churches, caſtles, and gentlemens houſes. The air within the town is unwholeſome, for which reaſon it is not ſo well inhabited now as it was formerly. The viceroy's palace is a noble building; and ſtands at a ſmall diſtance from the river, over one of the gates of the city, which leads to a ſpacious ſtreet, terminated by a beautiful church. This city contains a great number of handſome churches, convents, and cloiſters, with a ſtately large hoſpital; all well endowed, and kept in good repair. The market-place takes up an acre of ground; and in the ſhops about it may be had the produce of Europe, China, Bengal, and other countries of leſs note. Every church has a ſet of bells, ſome of which are continually ringing. There are a great many Indian converts; but they generally retain ſome of their old cuſtoms, particularly they cannot be brought to eat beef. The clergy are very numerous, and illiterate; but the churches are finely embelliſhed, and have great numbers of images. In one of theſe churches, dedicated to Bon Jeſus, is the chapel of St Franciſco de Xaviere, whoſe tomb it contains: this chapel is a moſt ſuperb and magnificent place; the tomb of the ſaint is entirely of fine black marble, brought from Liſbon; on the four ſides of it the principal actions of the life of the Saint are moſt elegantly carved in baſſo relievo; theſe repreſent his converting the different nations to the Catholic faith: the figures are done to the life, and moſt admirably executed: it extends to the top in a pyramidical form, which terminates with a coronet of mother-of-pearl. On the ſides of this chapel are excellent paintings, done by Italian maſters; the ſubjects chiefly from ſcripture. This tomb, and the chapel appertaining to it, muſt have coſt an immenſe ſum of money; the Portugueſe juſtly eſteem it the greateſt rarity in the place. The houſes are large, and make a fine ſhew: but within they are but poorly furniſhed. The inhabitants are contented with greens, fruits, and roots; which, with a little bread, rice, and fiſh, is their principal diet, though they have hogs and fowls in plenty. The river's mouth is defended by ſeveral forts and batteries, well planted with large cannon on both ſides; and there are ſeveral other forts in different places.

Goa is the reſidence of a captain-general, who lives in great ſplendor. He is alſo commander in chief of all the Portugueſe forces in the Eaſt Indies. They have here two regiments of European infantry, three legions of ſepoys, three troops of native light horſe, and a militia; in all about five thouſand men. Goa is at preſent on the decline, and in little or no eſtimation with the country powers; indeed their bigotry and ſuperſtitious attachment to their faith is ſo general, that the inhabitants, formerly populous, are now reduced to a few thinly inhabited villages; the chief part of whom have been baptized: for they will not ſuffer any Muſſulman or Gentoo to live within the precincts of the city; and theſe few are unable to carry on the huſbandry or manufactures of the country. The court of Portugal is obliged to ſend out annually a very large ſum of money, to defray the current expences of the government; which money is generally ſwallowed up by the convents and ſoldiery.

There was formerly an inquiſition at this place, but it is now aboliſhed; the building ſtill remains, and by its black outſide appears a fit emblem of the cruel and bloody tranſactions that paſſed within its walls! Proviſions are to be had at this place in great plenty and perfection. E. Long. 74. 0. N. Lat. 15. 31.

GOAL. See GAOL.

GOAT, in zoology. See CAPRA.

GOAT'S-*Beard*, in botany. See TTRAGOPOGON

GOAT-*Sucker*, in ornithology. See CAPRIMULGUS.

END OF THE SEVENTH VOLUME.

DIRECTIONS FOR PLACING THE PLATES OF VOL. VII.

PART I.

Plate	Page
CLXXXIV. to face	2
CLXXXV.	4
CLXXXVI.	20
CLXXXVII.	36
CLXXXVIII.	40
CLXXXIX.	168
CXC.	172
CXCI.	192
CXCII.	196
CXCIII.	280
CXCIV.	292
CXCV.	316
CXCVI.	348
CXCVII.	364
CXCVIII.	366
CXCIX.	368
CC.	372
CCI.	

PART II.

Plate	Page
CCII. to face	446
CCIII.	492
CCIV.	508
CCV.	524
CCVI.	542
CCVII.	580
CCVIII.	588
CCIX.	650
CCX.	
CCXI.	660
CCXII.	662
CCXIII.	
CCXIV.	
CCXV.	
CCXVI.	668
CCXVII.	672
CCXVIII.	676
CCXIX.	696
CCXX.	768
CCXXI.	792

[In all, 38 Plates.]